Established 1914

CHEMICAL MARKETS

VOLUME XXX NUMBER 2

Contents for February, 1932

CHEMICAL MARKETS *is indexed regularly in the* INDUSTRIAL ARTS INDEX

CHEMICAL MARKETS, Inc., Publishers

Publication Office, 28 Renne Ave., Pittsfield, Mass. Editorial and General Office, 25 Spruce St., New York City

WILLIAMS HAYNES, PRESIDENT; D. O. HAYNES, JR., VICE-PRESIDENT; WILLIAM F. GEORGE, SECRETARY-TREASURER

PUBLISHED ON THE TENTH DAY OF EACH MONTH AT PITTSFIELD, MASS. SUBSCRIPTION, DOMESTIC, TWO DOLLARS FIFTY CENTS A YEAR, IN ADVANCE, CANADIAN AND FOREIGN, THREE DOLLARS; SINGLE COPIES, CURRENT ISSUE, 25 CENTS; BACK COPIES, 50 CENTS EACH. NOTICE OF THREE WEEKS IS NECESSARY TO CHANGE SUBSCRIBER'S ADDRESS AND IN WRITING PLEASE GIVE BOTH THE OLD AND NEW ADDRESSES. PRINTED FOR THE PUBLISHERS BY THE SUN PRINTING COMPANY, PITTSFIELD, MASS. ENTERED AS SECOND CLASS MATTER, JANUARY 1, 1928 AT THE POST OFFICE AT PITTSFIELD, MASS., UNDER THE ACT OF MARCH 3, 1879.

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CHEMICAL MARKETS

VOL. XXX FEBRUARY, 1932 No. 2.

Alkali Markets

CHLORINE has all but replaced bleaching powder in its larger industrial uses. The consumption of borax and tri-sodium phosphate has expanded greatly. Ammonia has definitely become an industrial alkali. On the other hand synthetic nitrates and rayon have greatly increased the consumption respectively of soda ash and caustic soda. These are accomplished facts. In truth, the very foundations of our alkali markets have been moved. And now there appear on the chemical horizon some technical developments which promise further changes in what is the single most important consuming field of the various alkalies.

IN ALL sorts of cleansing operations a number of detergents have come into increasing use either alone, in combination, or as a supplement to soap. Various sodium salts—perborate, silicate and the newer metasilicate, and various phosphates—to say nothing of soda ash and modified soda, as well as borax, have constantly won favor as more definite knowledge of their effectiveness as well as their harmful action upon various fabrics becomes more common. This progress has been made because, as a capital British authority has recently pointed out in, *The Chemical Trade Journal*, soap is far from an ideal cleansing agent. "Apart from its somewhat limited detergent power" he says, "frequently requiring the use of other materials, it always suffers from the serious disadvantage of the insolubility of its lime and magnesium salts."

IT IS this last chemical handicap which may be overcome by a new rival, detergent products of synthetic organic chemistry. The I. G. have such a product on the market in various "Igepons", one of which is a white paste which lathers freely and whose lime salts dissolve readily in the hardest water. Presumably this is a sulphonated product derived from the aliphatic series. Sulphonated derivatives of the higher fatty alcohols have also been put on the market by the Deutsche Hydrierwerke. Higher prices make the competition of these "synthetic soaps" seem at present rather fanciful, but price has seldom proved to be an insurmountable obstacle, and while the fatty oils are very cheap today, they are peculiarly vulnerable as industrial raw materials being foodstuffs of fluctuating supply and speculative price. A very torpid in the old battle of land and laboratory imagination can see in these skirmishes some new alignments of the alkali ranks.

A Postscript to Congress There is a postscript to the open letters to Congress from some leading chemical industrialists which we print on another page. Mr. Queeny sent a copy of his letter, with a clipping of CHEMICAL MARKETS' December editorial on Taxes, to Senator Smoot. The gentleman from Utah, who has one of the most alert and efficient financial minds in public service today, replied:

> As you no doubt know, I have been an advocate of a sales tax for a number of years. In 1921 I introduced a sales tax bill and a sales tax amendment to the revenue act of 1921 but both were defeated. I feel certain that we will eventually have a sales tax. It is a matter of educating the people to the idea.

We welcome the implication in Senator Smoot's suggestion and the article by Robert C. Burnside in this issue is but the first of several we have planned on this pressing subject of a sounder tax system. A logical first step is to point out the dangers of state sales taxes which, though sound enough in principle, may easily introduce into our tax system very grave inequalities.

Our federal taxes are unfair and uncertain and inefficient. With Democratic control the opportunity for a critical examination of the whole Government revenue system as built up by the Republicans is quite in order. Drastic changes in the midst of deflating prices and contracting credit may be inexpedient. But it is good politics and good business to study the strong and weak points of our federal taxes. A major reform is plainly needed. It cannot be quickly accomplished; but it can be prepared.

Paying the Reparations Reparations appeared to be a purely academic question to the average American back when Wall Street speculation could be depended upon to pay his income tax. Now that that source of income has dried up and he reads daily about billion dollar deficits and higher federal taxes, and measures these against his shrinking receipts, he is deeply interested in reparations, allied debts, and their effect on his pocketbook.

With what joy then must he have read Mr. Knickerbocker's article January 19th in the New York Evening Post and syndicated throughout the country, in which the impression was plainly given that the mysterious process of transforming coal, lignite or brown coal, or heavy oils, into sundry refined petroleum products, called by a still more mysterious name, hydrogenation, held the possibility of paying off Germany's reparation bills in toto. Here was the pancrea for all our ills! Why had the good news been withheld so long ? Evidently another scheme of the international banking group!

Such unfounded statements are dangerous and should not be permitted to go unchallenged. Mr. Knickerbocker may, or may not, know that we have hydrogenation plants in this country and a company formed by German I. G. interests and the Standard Oil group prepared to license any responsible refining company to use the hydrogenation process. If he does, he apparently forgot it under the spell of his guides around the Leuna Works. Those in the industry know, of course, the worth of this newspaper man's impressions, but the non-technical American does not. Is it possible that he permitted himself unwittingly to become a salesman for a process which the German technologists have so far signally failed to sell ?

No Saturation A number of chemists and one or two publications in the technical field are concerned over the industry's ability to absorb approximately two thousand chemical engineering graduates annually for at least the next four years. Estimates by the U. S. Bureau of Education place the number of students now enrolled in college in chemical engineering courses at around ten thousand. This does not mean that these ten thousand will come permanently within the chemical or allied industries. The number of those who, for one reason or another fall by the wayside, or find their chances of success greater in other fields, is very large. The alumni roster of any engineering school will testify that the final number to be absorbed in the next five years will be much less than ten thousand.

It seems hardly necessary to institute a comprehensive educational program, as one paper insists, aimed at chemical executives and those in closely allied lines. The past ten years have witnessed only a partial utilization of the potential value of the chemical engineering profession. Industries which today are either not using chemical engineers at all or are only just beginning to avail themselves of this technical knowledge will rapidly appreciate the necessity of so doing for the very pressing reason that competitors will be turning out better, more uniform products at lower cost. The employment horizon for the future chemical engineer will be much broader than it has been in the past five or ten years.

Fire and Air Chemistry's ever increasing importance in our day-by-day existance is constantly being brought home to us in new ways.

In the recent examination for chief of the New York City Fire Department, the candidates were called upon to, "Epitomize the chemical and physical properties of five gases most widely used in the city as refrigerants and to discuss precautions commonly to be taken in their use," In addition, they were required to sketch an absorption type of refrigerating system, to describe briefly its method of functioning and operation, to give a list of twenty-five hazardous chemicals and describe their physical, chemical, and physiological qualities, the best methods of arresting or extinguishing them, and to describe how they should be legally stored and handled.

Colonel Starrett in a recent article in the *Saturday Evening Post* prophecied that in the near future controlled weather will be common not only in our public and commercial buildings, but also in our homes; that, indeed, structures not so equipped will be as antiquated as a building without central heating. Chemicals and the chemical engineer will play a very important part in this improvement. A great deal of research has been done to provide an ideal refrigerant and much has been accomplished. Still, the field is far from closed. Dr. Ward V. Evans of Northwestern University, in his address last year before the chemical section of the National Safety Council (abstracted in the November issue of CHEMICAL MARKETS) showed a table of ratings that indicated the ideal refrigerant is still unfound. J. B. Churchill, writing in the current number, while disagreeing radically with Dr. Evans as to individual ratings arrives at the same conclusion. The chemical industry is not slighting the problem. New chemicals are constantly being suggested. Only recently the duPont organization, which indirectly has a very large stake in the artificial refrigeration industry through its General Motors holdings, disclosed experimental work done with dimethyl ether. It would seem that the future growth of the industry is largely dependent upon its ability to construct large units using one central plant and for this a strictly non-poisonous substance appears to be almost a necessity.

Survival by Restriction What is the present status of the naval stores industry? When its leaders are in Washington seeking relief before the Farm Relief Board, rosin and turpentine are agricultural products. At all other times they appear to be entitled to the designation, "industrial chemical". By very nearly the same process of reasoning (always popular in Washington) the petroleum industry might seek to obtain Federal aid.

The salvation of the naval stores industry will not be found in anything Congress can do in Washington. The rescue will be staged several hundred miles further south. The alkali producers, the alcohol manufacturers, and the heavy acid makers have all made progress in the face of similar difficulties. Even the fertilizer industry is exhibiting very noticeable improvement along the same lines.

The new naval stores year which commences April first will be the most critical in the history of an industry which is older than the country itself. Turpentine prices are now above the low for 1929-1931, but Grade G. rosin and those below sank in the first week of the new year at Savannah to lower prices. Another year on timber leases has been consumed, plants have deteriorated further, and practically without exception, producers are poorer now than twelve months ago. The answer lies partly in restriction and the industry itself must do this. It is believed that even should restrictive measures as high as thirty per cent. be achieved that the surplus will prevent any improvement in prices for months. The other part of naval stores relief, which is sorely needed, must be found in discovering new markets.

Quotation Marks

The Federal Reserve System has enough gold to conduct open market operations exactly as in 1921. It can stop deflation and raise the price level by the expansion of credit to a point adequate for the functioning of the nation. Then and only then can the various measures now being taken for the relief of business and agriculture become effective.—*Samuel Crowther, "Your Money."*

Fifteen Years Ago

(From our issues of February 1917)

The Muscle Shoals Association urges on President Wilson the advisability of locating the proposed nitric acid plant at Muscle Shoals.

Wm. S. Gray & Co. increase its capital stock from $250,000 to $500,000.

Newport Chemical starts production of ortho and para nitrotoluol.

Butterworth-Judson Corp. abolishes the position of chairman of the board and reduces Board of Directors from eleven to eight.

Frederick Rowland Hazard, president, Solvay Process Co. dies Feb. 27, aged 59 years old.

Open Letters

From American Chemical Industry

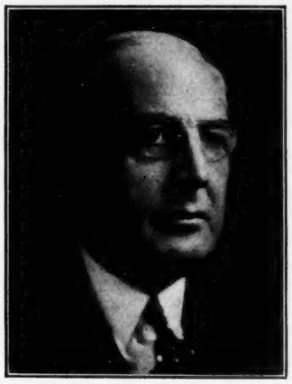
to Congress

How closely taxes touch the interest of our great industries may be gauged by the prompt and open-spoken comment evoked from important chemical executives by our editorial on this subject. We commend these opinions to the attention of Congress. They tell in plain language what responsible leaders in our largest manufacturing industry are thinking. They indicate with almost brutal frankness a course of direct action for legislation to follow.

From Horace Bowker

President, American Agricultural Chemical Co., New York

I urge you to combat with every ounce of pressure you can bring to bear the tendency of Congress and State Legislatures to try to finance what you aptly term economic stop-gaps; this tendency presents a grave national problem and the only safeguard is an aroused and informed public opinion.



Likewise, I feel that it is equally vital to make the public realize that Federal, State and local government budgets must be made more responsive to general business conditions. In time of depression industry is forced to pare expenses to the bone, to effect every possible economy, to overhaul the entire structure, in order to get down to bedrock. Governments choose to recognize no such compulsion. Politics shuts its eyes to economics. And industry suffers in silence.

I see no evidence of an adequate effort on the part of any government, whether Federal, State or local, to reflect in its budget-making the same type of sincere thought and fearless action that the head of every business must today exert in order to survive. All one hears about is a wholly inept and utterly inadequate "discussion" of budget reductions that somehow or other never seem to materialize.

This failure on the part of government to recognize its obligations is the basic reason for mounting governmental deficits—and these deficits are a signal of governmental inefficiency which cannot be explained away solely in terms of declining tax returns. Business must anticipate decreased income; so must government. No system of taxation can provide a substitute for sound, economical budget-making.

Therefore, I suggest that when you tackle the job of promoting public opinion in favor of sounder methods of taxation you are in reality tackling only half the job. I therefore urge you to organize an equally vigorous drive against excessive government spending, not alone in respect of what you term economic stop-gaps but also as regards routine governmental expenses.

If I were in your position I should seriously consider broadening my effort to include not only our own industry, but to enlist the co-operation of industry generally in this movement. There is a great opportunity for someone to assume this vacant leadership. The only solution for a problem which is steeped in the deepest politics is a militant public opinion.

From H. L. Derby

President, The Kalbfleisch Corp., New York

It is absolutely necessary for our Federal Government to protect its credit. In order to do this we must in the shortest possible time find some method of balancing our national budget.

Corporations frequently find themselves in the same position as regards the balancing of budgets as the United States Government today finds itself. They differ from the Government, however, inasmuch as they cannot call upon outside sources or contributors to produce more funds in order that their income may equal their expenditure. In such a situation the first step of a corporation must be to reduce materially its expenses. This is the line being followed today by practically all our big corporations and by provident individuals. I am personally fully convinced that this is the line which our Government should take at the present time.

Let us by all means have such legislation as may be necessary for the economic good of our country but do not let us try to legislate prosperity into existence. Unfortunately, the trend of thought both in Federal quarters and in State administrations does not seem to be to endeavor to bring present expenditure within present income, but on the contrary the tendency everywhere is to endeavor to originate methods and tax systems which will raise sufficient funds to meet present expenditures. This appears to me to be not only bad business but bad economics. There is crying need for stringent reduction of public expenditures and I think that the example set by many of our large corporations in this respect might well be followed. The growing tendency on the part of some legislators to saddle the Government with the responsibilities which properly rest with a particular locality or with the different States is unsound and results in great waste.

A comprehensive statement which would deal intelligently with the tax program for this country could be made only after long study, careful analysis, and highly specialized knowledge. The question is too large to be dealt with offhand by a single individual. The Secretary of the Treasury has suggested means whereby certain of these taxes could be extended to bring in an increased revenue. Any changes to be made at the present time should I think be made along the lines suggested by him. In a period of depression there is great danger that complicated changes may so upset the economic machinery as to retard our recovery.

Eventually it may be possible to introduce some new forms of taxation that will place our tax system on a sounder basis. These should have a very thorough study and analysis and in this respect it seems to me that Chemical Markets might be of considerable assistance. It could outline for us all of these various taxes, showing the advantages and the disadvantages, the difficulties of allocation and collection, a determination as to their fairness or unfairness upon all classes of individuals and corporations, and aid us very materially not only to reach a better understanding of our system of taxation but to become better judges as to what system is best adapted to our country's needs.

From H. F. Hyland

Treasurer, Mathieson Alkali Works, New York

While I believe we are all agreed that the tax assessments now in force are not adequate to cover the enormous increases of expenditures that the Federal and State Govments are faced with, it opens up a very exhaustive study of what recommendations could be made to meet the contingencies which have apparently arisen owing to the fallacies of our present tax methods. Obviously, the present law will have to be revised to meet these contingencies, and as we all hope it is an emergency only, and it will be incumbent upon the Government to again change the system of tax laws as conditions permit. Many politicians have had a part in formulating the present tax system and a letter of this type can hardly be expected to cover the shortcomings in the law.

In our opinion, we can get our tax on a sounder basis if prominent executives, rather than politicians, could be induced to take a more active part in the formation of governmental policies. Then our tax system, being a part of that Government, would be on a sounder basis.

The turnover tax has come to the writer's attention and there seems to be a growing tendency on the part, particularly, of individual States, to lean toward a turnover or a sales tax. It is the writer's opinion that this tax if it could be properly administered would be one of the solutions of sounder taxes but here again there are so many difficulties which face the enforcement or the collection of the turnover or a sales tax that it opens up a very broad study as to the methods of its application. There seems to be no way of avoiding taxes until the Federal and State authorities arrive at a point whereby their budgets and expendi-

tures are curtailed to that extent, and while we hear of economies being presented in the various legislatures, the fact remains that all State budgets are increasing tremendously, and the only point of attack seems to be from political manipulation toward reducing taxes in a certain class, by increasing taxes and assessments to make up the deficiencies. There is a movement on foot in the State of New York at the present time to decrease franchise taxes which is analogous to income taxes in other States, but owing to the fact that Governor Roosevelt pledged himself to the reduction of real estate taxes, it appears at that time he had no knowledge of how the expenditures of the State would be met if this procedure was carried through. Industry has been very much interested and a committee was selected, upon which the writer was represented, which has prepared a very exhaustive brief which has been presented to the legislative committee appointed by Governor Roosevelt, by which we could work out recommendations to him as to how to meet the budget, and it is the opinion that a drastic change will be made in the franchise tax in the State of New York to meet Governor Roosevelt's recommendations of reduction in real estate taxes, by including unincorporated companies which, heretofore, have not been included under the present law. No doubt a small sales tax will also be recommended and it is the writer's belief that it will be carried through the legislature. It hardly seems possible, therefore, to avoid these various methods of taxation until, as stated above, the various departments of both the Federal and State governments sharpen their pencil to the extent of spending no more money than they can readily obtain through just and fair taxation.

From Elvin H. Killheffer

President, Newport Chemical Works, Passaic, N. J.

Proposed tax legislation of not only our national, but also state and other forms of government, is headed in exactly the wrong direction; and my thought would be that we ought somehow to get back to first principles and in a governmental way live within our income just as we strive to do as individuals. A great many governmental expenditures could well be done away with entirely and others materially reduced in an effort in this way to balance the budget. Instead of this we have the spectacle of higher and still higher taxes on individuals and on industry, the result of which is to build up a system that eventually chokes us.

There is, of course, a fundamental difficulty in the whole tax situation in this nation and that is by and large in all of our governmental systems from the highest to the lowest, the majority of the tax makers are not the taxpayers and as a result they feel no personal restraints whatever.

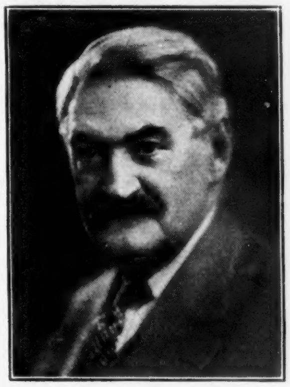
The situation in our national tax-making scheme, in my opinion, is just as fundamentally wrong as is our treatment of the Mississippi River problem. In this case we build from year to year dykes, and more dykes, and as a result, we help in building the river bottom itself higher and higher so that we face a constantly increasing danger of floods over the surrounding country which is lower than the river itself and which constantly is being made still lower proportionately by our handling of the situation. If instead we devoted all of our energies to the dredging of the river bottom itself, over a long period of time the result would be much more sound and satisfactory.

In the two situations there is in my opinion a very close resemblance.

From John F. Queeny

Chairman, Monsanto Chemical Works, St. Louis, Mo.

There is no question but that Congress must find additional methods of raising revenue. At the same time it does not seem possible for industry or the people to stand rates of taxation higher than at present exist, and even if rates were advanced I doubt if such higher rates of taxes, that might be levied, would yield sufficient additional revenue to support the Government.



There always have been—for many years, at least—advocates of a sales tax, and which has so many advantages over the present system of taxation, (1) costs less to collect, (2) the amount of revenue that sales tax would yield can more readily be estimated, in my opinion, than any other method of taxation.

The sales tax has been a success in many countries, and I think we are due for it here, particularly in view of our present financial conditions. It is a form of taxation that can be passed on to the purchaser, without it being considered any particular burden by the purchaser, that is if the rate is not made too high—I say not to exceed 1%. That system may be particularly vulnerable, as you suggest in your editorial, but the system has lived for many years, and has been satisfactory, in other countries, without any complaints.

I do not know of any sounder basis for taxation. To be a success there should be no exemptions from

such tax which some specialized industries might demand—particularly the automobile industry.

I know the subject is a big one, and I also know that there will be many arguments against the sales tax, but, again, will such arguments be any more numerous than the arguments that will come from every quarter against any additional rate, or form of taxation ?

From Herman Seydel

President, Seydel Chemical Company, Jersey City, N. J.

The extravagance at Washington from the Vice-President down to the thousands of useless clerks is the root of a national evil. A billion dollars can easily be saved: Fire should be applied to all temporary office buildings and the Federal Katydids should be transformed into national working ants. Let the idle feeders at the national trough do some self-supporting work.

What applies to national affairs applies likewise to state matters. Do you think that you can collect taxes due and past due by going through what every state and community is doing when it puts most of the apartment houses in receivership and most of the idle land up for tax sale ? Selling out a poor farmer to the gambler who buys land at tax sales is not going to solve our state problems, but getting rid of half of our office holders should decrease our state expenses, our county expenses and, last but not least, our community expenses, easily down to half. That is the way to a balanced budget.

As for the collection of taxes, I am absolutely of the opinion that any system that permits highjacking of the taxpayer to exist and grow, like the present income tax, is a national crime. Have the tax by all means independent of the tax appraisor and collector; but otherwise, history teaches me, that taxes have always been collected in whatever way it was easiest.

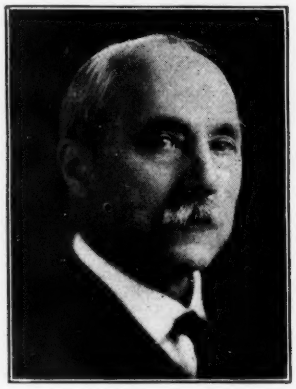
I am for tax reduction by the way of national, state, and local economy and honesty. Don't forget that by honesty I mean wiping out the 18th amendment, consolidation of the War and Navy Departments into a Defence Department, dismissal once and for all of gun makers that have guns that shoot backwards, and naval experts that design ships which will only float bottom upwards; see our recent experience with the ten thousand ton cruisers. Abolish 90% of the postal franking privileges and confine national activities to the very minimum.

We Congratulate ---

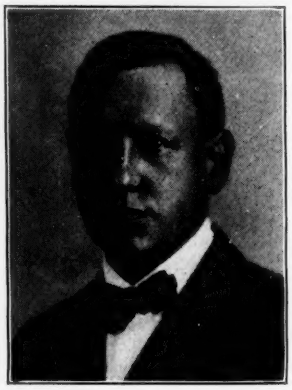
R. W. de Greeff, February 3, 1884
Godfrey Lowell Cabot, February 26, 1861
Frederic Rosengarten, February 27, 1877

Robert De Greeff was characterized by one of his competitors the other day "as the best thing that came to us out of the World War." He arrived in New York in 1914 to take charge of the American branch of the business of the old Anglo-Dutch chemical trading house of R. W. Greeff & Co., Ltd. He has stayed and won a very important place in the very difficult field of chemical distribution. He has done so because he knows his intricate business thoroughly; because he has made good friends; because he has associated with his firm good men; and most important because he is a good executive and a good sportsman in the best meanings of both those heavily overworked words. He studied chemistry under Fresenius at Wiesbaden and golf under numerous capable "pros," and he is a member of the Chemist's Club and Cherry Valley.

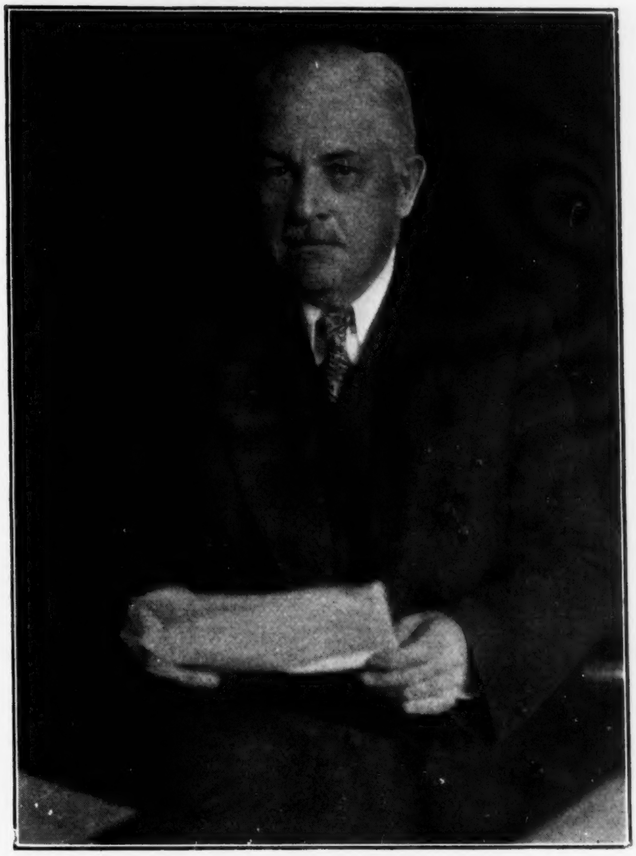
The Cabots of Massachusetts are born in the pioneering tradition, and all his long, active life Godfrey L. Cabot has been fired with that spirit. He was graduated from Harvard *cum laude* in chemistry—that was in 1882 long before the sciences were popular subjects. In 1917 at the age a substantial Bostonian reasonably expects to retire to his North Shore estate—he was commissioned a lieutenant in the U. S. Navy and did duty, not at a desk, but in command of a flying school where he developed the first technique of picking up burdens from a plane in flight. This year his company celebrates the golden anniversary of its first production of carbon black. In this industry he was a real pioneer, not only in production, but in the methods both of manufacturing and marketing.



One hundred and twenty-two years ago a Philadelphia accountant, George Rosengarten bought out two quarreling Swiss chemists. Frederic Rosengarten, his grandson is the last link in the chain that binds that illustrious name to fine chemical history. Youngest of the three brothers that succeeded to the business early in the century, he was peculiarly fitted temperamentally and by training for the administrative side of the business. Recognizing his abilities the directors of the new Merck wisely requested that he assume the position of chairman of the board. Still in the prime of life we trust that his company and the industry generally may have the benefit of his wide experience, judgment, and wisdom, for many years to come.



Sales Taxes But Without Sales



The utter futility of attempting by means of a state sales tax to raise funds for state governments exposed

By Robert C. Burnside*

"As CERTAIN as death and taxes" has long been a trite and humorous expression. When one is ill, however, death is not so very laughable. Taxes cause no mirth when business is in the doldrums where we find it today. Taxes are inevitable, but it is becoming more apparent that taxes must be sensible.

"More revenue!" cries the legislature, the executive, and the judiciary of our Federal, State, and Local Governments. More money to cover deficits; more money to build wider and better roads; more money for schools and educational facilities; more money for hospitals, homes for the aged, prisons, and other institutions; money to provide unemployment relief, more money for each department of the government for desirable and worthy projects. Businessmen, and other taxpayers, seem to be pouring their earnings into the insatiable maw of this taxation machine.

Every item on the budget, whether it be for the Federal Government, the State or the City, has its ardent supporters. Organized groups, blocs and lobbies have headquarters near our Legislative Halls, and by arguments, or by persuasion, or by threats of political consequences, are urging their pet schemes into laws carrying appropriations. Governments have been assuming greater and greater responsibilities, providing for the safety, health, comfort and welfare of citizens. Every service so rendered adds to the cost, which in turn is saddled upon the taxpayers.

In those blessed days, now passed, when there were earnings and profits, businessmen paid. The old French principle of taxation applied. They got the "most feathers with the least amount of squawking." But, in these days when orders are scarce, and sacrifices must be made to get a name on the dotted line, when profits are wiped out, dividends have ceased, retrenchments have been made, taxes, a substantial part of the overhead, go to swell the red figures on the wrong side of the ledger. These are times when taxes must receive the most severe scrutiny, even though the process involves also taking the governmental bureaus into the laboratory for a thorough test.

Many of the programs of our elected officials can no longer be considered on their merits, or the desirability of such undertakings. It is not an academic, social or political question as to what services our governments should render. The point at issue is purely and simply an economic one. What can a community support, and what can its business institutions and its taxpayers finance ? In times like these we must decide not what the government should do, but what it can do, and still maintain its credit. Always before the eyes of the legislature had been that juicy and tempting fruit, like the mythical orange before the eyes of Tantalus. A "sales tax" or a "turnover tax," a small percentage of the price of each purchase, looks like the Eldorado, or the inexhaustible money bags which only need to be tapped to furnish ample funds for all that governments desire to do.

And, particularly, do State Officials look at this proposal with desire in their hearts. They find, or invent, plausible reasons for advocating it. It is a broad tax base, and, therefore, desirable. It distributes the burden and it is democratic. It is paid in small amounts, and is no hardship. Most especially,

*Pres., Asbestolith Mfg. Co., and Managing Director, N. Y. Board of Trade, Inc.

it provides money in large quantities for those undertakings near and dear to the hearts of the electorate. No more pernicious, deceptive, or highly dangerous method of taxation could be proposed for any state.

The business in which the writer happens to be engaged is a highly competitive one. Our Company sells its products, not only throughout the United States, but we ship our goods to South America, Africa, Australia, New Zealand. We are brought into competition, not only with companies located in other States throughout this country, but we have foreign competitors, whom we must meet in the arena of world markets. To us, therefore, as to many manufacturers of other lines, a State Sales Tax would be, not only a hardship, but a positive detriment to our business.

Why the State Sales Tax is Impractical

The following eight reasons are by no means a complete list of arguments against a State Sales Tax, but they will suffice to indicate our opinion that it is not only undesirable, but dangerous.

1. A manufacturer located in a State with a Sales Tax is at disadvantage in competing with another manufacturer in his own line located in a State where no such tax exists. Business today recognizes no political boundary lines. Highly developed transportation, and high speed communication have wiped out the entities of time and space. The New York businessman finds his customers in New Jersey, New Hampshire, New Mexico or New Zealand. His selling price, whether it be chemicals, drugs, textiles or machinery is the sum total of his production costs, plus, we all hope, a margin of profit. Quality and service are important considerations, but the sine-qua-non today is price, and a State Sales Tax would have to be added to production cost. His competitor from any other State would not have this item to reckon with. So close is competition today that the burden of a State Sales Tax would in many instances determine where the order is placed. The New York manufacturer, if our State had a Sales Tax, would lose business that was rightfully his, if he did not have to carry on his back this "old man of the sea."

And manufacturers are not stupid. They would immediately take steps to meet such a situation. Our taxing authorities should recognize that many hundreds of thousands of dollars have been spent, business up-rooted and moved, to save a few cents on the production cost of each commodity. A State Sales Tax bears with it something more serious than an idle threat that business would leave the State, and thus at once would taxing authorities "kill the goose that lays the golden eggs," and discover that they had on their hands a tough and scrawny old bird that would not delight the palate. Large establishments have moved to find a more favorable labor market, others have changed in a search for better transportation facilities. Muscle Shoals will attract industry because of cheap power. Taxes have driven more industries out of some cities, than their Chambers of Commerce could attract. If State Officials think that industries within their State must of necessity remain there let them take into serious account the movement of textile mills toward the South, as one solemn warning.

2. There would be a multiplicity of taxes on the one commodity. Business today has become highly specialized. Only in very simple processes, or in unusual instances, is the complete process of manufacture from raw products to finished goods under one control or management. The idea of a turn-over tax on each sale that precedes the finished product is so ridiculous as not to be worthy of consideration.

3. It would resolve itself into a tax on the gross volume of business and not on the net profits.

4. A Sales Tax would present almost insurmountable difficulties, and high costs of collection. The primary purpose of taxes is to secure net revenue for government. One of the chief merits of any system of taxes is that it will turn into the State Treasury the highest percentage of the money that it took from the taxpayer. Costs of collection should be minimized. This desirable condition could not possibly obtain in connection with a State Sales Tax. Scores of accountants, investigators, enforcement officers and tribunals of justice would be necessary as part of the state machinery to collect such taxes. All of this personnel would be an added burden to the taxpayer, who would have to pay the salaries of those who would compel them to pay the tax.

5. As a corollary to the above a State Sales Tax opens up the gate and paves the way for deception, evasions, bribery and a further break down of governmental enforcement machinery. Hasn't the spectacle of the attempt to enforce the Prohibition Act taught us anything ? Hasn't the public learned that there is such a thing as boot-leg gasoline, which is carried into States that have a high gasoline tax, and sold without paying the tax which competitors are paying.

6. A sales Tax, as a basic system, ignores the fact that much of our modern business is service, and not the transfer of commodities. The lawyer does not sell his brains; nor does the doctor sell his skill; nor do transportation companies sell freight cars and trucks; nor does the telephone company sell its instruments; nor does the bank sell commodities, nor is the policy of an insurance company an article for sale as would be interpreted by a Sales Tax. The manufacturer and the merchant would bear the brunt, and they could trust to a kind Providence to permit them to unload a portion of their burden on the consumer.

7. Real estate would not find the relief which it is seeking.

8. A State Sales Tax would place the maximum burden upon those less able to support the state. The small wage earner, who is constantly striving with difficulty to make his income stretch over the multiplicity of needs of a growing family, would be taxed at every turn. Let it not be supposed, even for the purpose of argument, that the manufacture, the distributor or the retailer will be able to absorb this tax. It ultimately must be passed on to the consumer. No argument is necessary to demonstrate that the larger the income the lower is the ratio of expenditures. This truism has been recognized by many of our politicians who have invented the happy phrase—"Luxury Tax." Selective Sales Taxes, with the possible exception of the gasoline tax, has all of the objections of a general Sales Tax. The exception is noted in the case of a gasoline tax, because all states have adopted it, and its manufacture and ultimate distribution is in the hands of a few large concerns that are more easily held responsible.

Let none be so sanguine as to expect, or even hope, that the imposition of a Sales Tax will result in materially lightening the burden of the existing tax laws. The tendency of governments is to aim at increased income, and this cannot be accomplished by surrendering any available sources of money. Therefore, it would seem reasonable to attack the Sales Tax on two fronts, the first, against its merits, and the second, against increased taxation.

The cost of public administration has risen so rapidly in the past forty years that in our discussion of particular methods of raising revenue we should not lose sight of these important trends. The per capita expenditure by our Federal Government has risen from \$4.61 in 1890 to \$33.12 in 1928. State Governments which forty years ago spent only \$1.22 per capita, spent in 1928 the sum of \$15.24. These are staggering increases, but are mild compared with the increase in local expenditures from \$7.73 in 1890 to \$56.84 in 1928. The total expenditures as compiled by the National Industrial Conference Board show that for every man, woman and child living in the United States in 1928 there was spent by the three authorities, the staggering sum of \$105.20 per year.

An Official of New York City, in a position of high authority, is quoted as having said recently—"The honeymoon days are over." It is now imperatively necessary that society organized in governmental units must retrench the same as individuals have done, and the same as business has done. A spectacle of our three largest cities—New York, Chicago and Philadelphia, having financial difficulties should be regarded not as spectacular reading matter in the newspapers, but rather as a solemn warning to begin at the other end of our treasuries. It is not a question of how to get the amount of money each governmental agency needs, the important issue is to make the needs more nearly coincide with what the government can get through a form of taxation that is just and equitable.

Association News

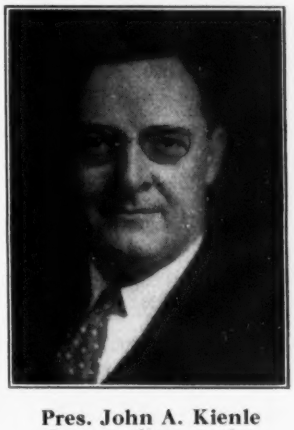
Several important meetings were held during January including the Compressed Gas Manufacturers' Association at the Hotel New Yorker, January 25-26 and the annual meeting of the Drug and Chemical Section of the N. Y. Board of Trade. In addition several important announcements were made concerning the 1932 recipients of honors. On Jan. 25 President Breithut, American Institute of Chemists made formal announcement of the selection of Dr. Charles H. Herty for the institute's medal while the N. Y. Section of the A. C. S. awarded the Nichols medal to Prof. James Bryant Conant, Harvard, who was also presented with the Chandler medal of Columbia University on Feb. 5. The annual report of Percy C. Magnus, chairman of the N. Y. Section of the Board of Trade is printed in the News Section together with the report of the Committee of Manufacturing Chemists.

Frederick E. Breithut
Announces A. I. C. award

Important news came from Frank Byrne, Monsanto, and the new secretary and treasurer of the Salesmen's Association that Lowell Thomas who unfortunately failed to occupy the seat of honor at the Chemical Industries' Dinner held in connection with the 1931 Chemical Exposition in May last will address the Association on Feb. 24. Further details are to be given at a later date.

Compressed Gas Manufacturers Meet

At the Compressed Gas Association meeting, Jan. 25-26 particular attention was given to changes and improvements in the matter of transportation. After an address by E. C. Turner, retiring president, the first session was given over to a paper on, "Industrial Applications of Petroleum Gases" by H. Emerson Thomas of the Philgas Co. This was followed by an address by L. A. Belding of the General American Tank Car Corp. who read a paper on "Tank Cars Show the Way to New Industrial Economies" (printed in full, p.153). Papers given in the afternoon session and the following day included "Economic Distribution of Liquid Chlorine" by W. L. Savell, Mathieson Alkali (p. 150 this issue); "Solid Dioxide Developments" in 1931 by Dr C. L. Jones: "Toxic Gases" by Captain M. E. Barker of the U. S. Army.



Pres. John A. Kienle
Outstanding service recognized

Dr. Charles L. Jones presided as chairman of the technical session in the afternoon, Jan. 26, when C. E. MacQuigg, of Union Carbide Research Laboratory, and J. J. Crowe, of Air Reduction discussed "Development of Containers for Transportation of Gases Under Pressure." F. Eder, of the Robert W. Hunt Company, presented a paper on "Containers, Their Form, Formulae, and Deformation."

New officers elected for this year: John A. Kienle, vice-president director of sales, Mathieson Alkali, president. He was second vice-president last year. First Vice-president, F. A. Eustis, Virginia Smelting Co.; second vice-president, F. J. Ring, Linde Air Products and secretary-treasurer, F. R. Fetherston.

That Russian Chemical Threat—Is It Real?

By Gareth R. V. Jones and F. A. Hessel

IN RUSSIA of the Tsars chemical industry was of no significance. Such products as dyes, medical, laboratory and photographic chemicals, and fertilizers were not made and during the terrible years of wars and revolutions the chemical industry sank to so low a level, that by 1920 the output of chemical products was only a fifth what it had been in 1913.

The new regime which seized power in November, 1917, after the Civil War of 1918-21 began the reconstruction task and by 1927 the chemical industry had attained pre-war level. But this was far from satisfactory to the authors of the Five-Year Plan. They realized the significance of chemical industry and they knew, moreover, that, by utilization of wastes and the application of chemical methods to their raw materials, this industry would be a most important factor in the new economic system. Accordingly the "chemicalization of Russia" became an essential part of the Five-Year Plan.

Photographs, Courtesy "U. S. S. R. in Construction"

The realization of this plan offered tremendous difficulties not the least of which was, and still is, the acute shortage of native technicians. The Soviets have been forced to employ thousands of "bourgeois" engineers and specialists, most of them Americans or Germans. Some of these imported experts were at once set to work exploring the mineral wealth of the country; others are helping to train the tens of thousands of qualified chemists and technicians needed to carry out the Plan. Noted foreign consultants have come to Russia to lecture and assist in production. Many technical assistance contracts have been made. The Westvaco Chlorine Co. for instance, helped the Soviets to build chlorine and caustic soda plants.

Giving such assistance to the Russian has not been easy. Soviet officials have not always co-operated. Technical men trained in Russia often refuse to accept plans and reports of foreign experts and friction ensues. One well-known sulfuric acid plant,—for

F. A. Hessel

example, was in terrible shape and fumes all over the building made work there a positive danger. An American expert reported on the state of affairs in that factory. The communist authorities ignored it. He wrote a second report, again nothing was said. When he persisted and wrote a third time, the authorities refused to see him. Indeed it was not until they were forced to do so, that they made a few improvements.

If the foreign chemist has been hampered by lack of cooperation, Russian chemists, trained under the old regime, have had even worse difficulties. They have been ridden by fear, lost their initiative. The bolder bourgeois' chemists sometimes went in for sabotage and the chemical industry has suffered through activities of enemies of the Bolshevik system. These chemists of the old school have been treated better since Stalin has advocated that bourgeois experts should be more highly paid and receive the same privileges as the workers.

Living Conditions Affect Production

Although the condition of skilled workers has improved, the general standard of living is still very low. In many towns lack of food is great and sleeping space so inadequate that workers take flight. This has greatly hindered the progress of the chemical plan for no sooner has a worker learnt his job than he makes his way to another factory. Upon the skilled worker, however, the Government has an iron grip in the form of the food-card, without which it is difficult to live in Russia.

Officially the workers have a seven hour day in the chemical industry but in practice it is very often much longer. Whereas in theory until a few months ago they worked four days and rested on the fifth they were often obliged to work voluntarily on their rest day for some special purpose; for example to provide funds for the "Zeppelin" which the Government intends to build. Many young people rally enthusiastically to such a cause, but the majority nod their heads thoughtfully and only work because they must.

The officials in charge of chemical industry have learned from experience that to allow their factories to be run by workers committees is to court disaster. These committees spend hours wrangling over small points and had difficulty in making decisions. In the present system one director has full authority and responsibility. Before the director is appointed however, the Communist Party Committee in the factory and the trade union officials are consulted. The director is usually a communist and always carries out the will of the Party. The Trade Unions have lost much prestige and function mainly not as a defender of workers but to spread education and to increase production.

It has been necessary, to import a great deal of chemical machinery and equipment. Moreover, certain raw materials have had to be imported such as rosin, sulfur, salt-petre, quinine, dyestuffs and tanning materials. Russia, however, contains enormous reserves of raw materials, most of them but recently discovered, and if difficulties in the way of "chemicalization" are great, possibilities are immense.

Volume of Planned Construction

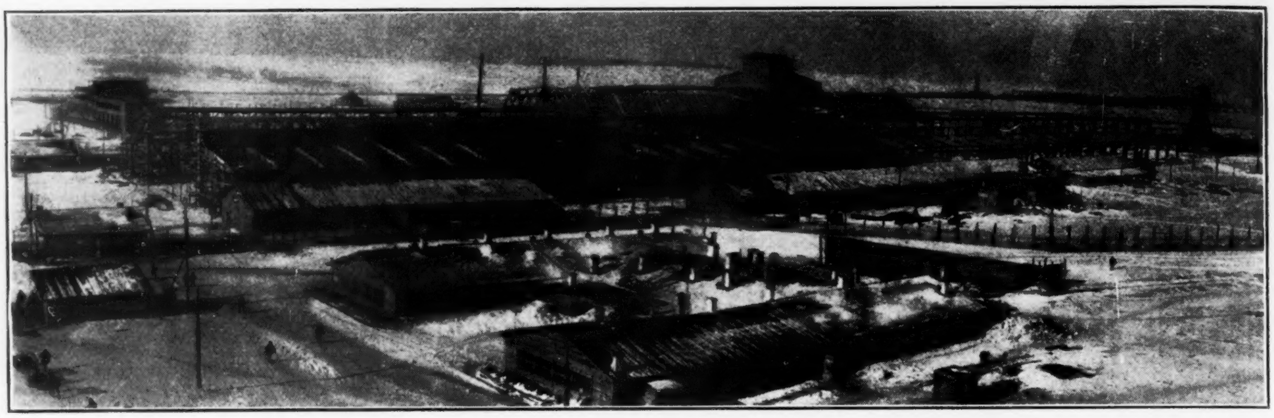
Roughly the Plan calls for the Ukraine to become the important chemical production center. Construction here will represent a total capital investment of 350 million rubles, roughly $175,000,000. The Central Industrial region is to be the center of large fertilizer works and 250 million rubles, ($125,000,000) are to be invested there. In the Northwest region where superphosphate is to be produced, 80 million rubles ($40,000,000) are to be spent on construction. An investment of 200 million rubles ($100,000,000) is to be made in the Urals, reputed to have some of the world's largest potash deposits. Siberia and the Far East are being thoroughly explored for their chemical resources. In the former lakes rich in salt have been found, but for the time being it is planned to produce only 60,000 tons annually.

By 1932-33 the total capital invested in the chemical industry is expected to amount to 1,400,000,000 rubles ($700,000,000) and the country is expected to produce 3,400,000 tons of superphosphates, 1,500,000 tons of potash salts and 800,000 tons of nitrogeneous fertilizers a year. The production of many plants now running is expected to be increased and new products are to be added to the list of chemicals now manufactured in Russia.

To aid this industrial activity an Academy of Chemical Science is being built at a cost of 15 million rubles. There already exist chemical scientific research institutes, but their work has been far from satisfactory. Co-operation between the research and industrial workers is weak, and the institutes fail to attract the young and gifted men. The Soviet Chemical schools are attempting to produce at express speed an army of proletarian chemists to replace the bourgeois experts. In their zeal for speed Communist authorities often give a superficial grounding in chemistry, and numbers of so-called experts rushed through institutions have knowledge that is in reality exceedingly rudimentary.

Gareth R. V. Jones

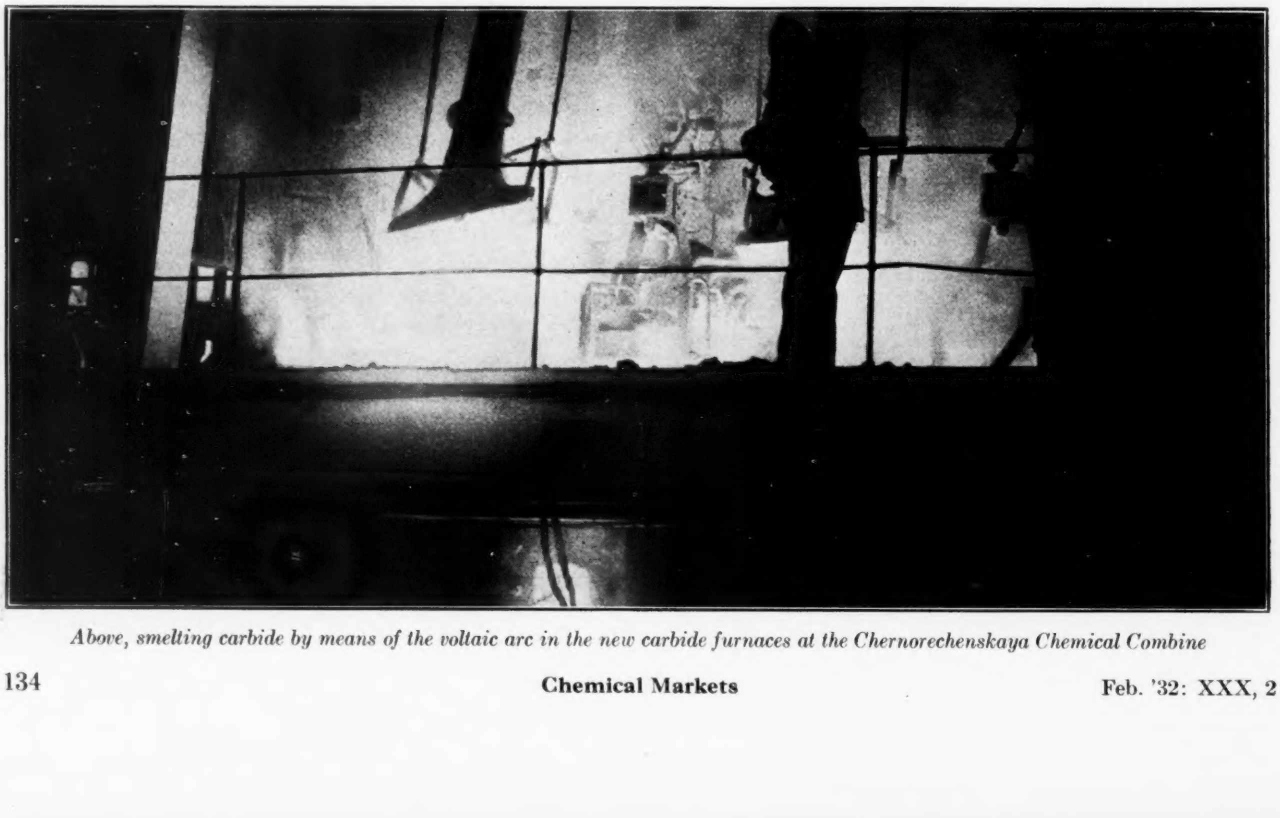
It is of interest in passing to note that protection



Above and opposite panoramic view of construction at the Voskressensk Chemical Combine. Plans were drawn up in 1928-29. Group consists of sulfuric acid and superphosphate plants

against poison gas forms a large part of the training given to young people throughout the Soviet Union. In one village a thousand miles from the nearest frontier, the president of Village Soviet pointed with pride to the closed Church. He said "We are converting that into a Club, where we shall have meetings of the "Ossoaviakhim" (the Society for Aviation & Chemical Defense). Where the superstitious old folk used to pray, we shall have gas masks, hanging up and we shall prepare the villagers for the chemical attack which is inevitable." The Society to which the Village President referred, has as one of its chief aims the spreading of chemical knowledge among its 11 million members. In an interview which one of the writers of this article had with the Secretary of this Society, he said: "We do not want to fight, we desire peace, but the whole population must learn how to handle gas masks. Under the auspices of our Society the children learn how to make objects counteracting poison gas. We believe that war between the Capitalist countries and the Soviet Union is inevitable, and many think that it may take the form of a sudden aerial and poison gas attack by the Capitalist countries."

Chemical plants are being constructed at the same rapid rate that experts are being trained. Speed is the watchword. If the orders from Moscow are that a factory must be built within a few months then that factory must be ready regardless of quality of work or the fact that within a short period the walls may crack and the roof leak. The Khimproekt (the Building for Chemical Projects) in Moscow is a good example. It looks exceedingly impressive in a photograph or from a distance, but when one enters it, one is struck by the careless way in which walls, windows, doors, ceilings, in short everything have been set up. The desire to attain what is called a "Bolshevik tempo" is a decided setback to the achievement of real solid progress. Many young bolsheviks are so anxious that their caustic soda or sulfuric acid plants shall be featured in the Soviet press as a model to other factories and shall be granted the Order of Lenin that they aim at obtaining dazzling temporary figures rather than at concentrating on steady dull but essential ground work. They prefer to open new



Above, smelting carbide by means of the voltaic arc in the new carbide furnaces at the Chernorechenskaya Chemical Combine

factories rather than consolidate the achievements of old ones.

The most powerful stimulus to chemical industry in Russia is the urgent demand for fertilizers. The agricultural development of the country depends upon them and industry as a whole depends upon agriculture. In 1929 the output of fertilizers increased from 260,000 to 600,000 tons. However, the ambitious program set forth above is still far from being fulfilled. The struggle to create a Soviet potash industry has been going on for four years in the Ural town of Solikamsk, where a plant is operated with the aid of German experts; but the work has apparently been hampered by a shortage of building materials and chemical machinery.

Another chemical produced under the Tsars and now "featured" by the Soviets is caustic soda. At first the work was concentrated in the Lenin Soda Plant but now the new plants at Berezniki and the Donetz Basin are manufacturing large quantities. The output of this product in 1913 was 49,373 tons, in 1927-28 this figure was raised to 55,827 and in 1929-30 to 74,000. Indeed there was almost as much caustic soda exported during the first quarter of the latter year as during the whole of 1928-29, Germany being the most important purchaser.

The Five-Year Plan provides for a chemical output sufficient to exceed the home demand and to give a surplusfor exports. At the present time a certain amount of products has to be exported, whether needed locally or not, to pay for imported machinery and materials.

According to the U. S. S. R. Chamber of Commerce the Chimimport, the organization for importing chemical raw materials, semi-manufactured chemicals, and chemical equipment, placed during the first six months of 1931 orders in the amount of 7,755,000 rubles ($3,897,000) as compared with 16,262,900 rubles ($8,131,000) for the corresponding period last year. The following table shows the distribution of these orders among the different countries, compared to the orders placed in the corresponding period of 1930.

Table I

Countries	*First Six Months 1930*		*Percentage*	*First Six Months 1931*	*Percentage*
Chili	6,265,600	rubles	38.5	224,900	2.9
Germany	5,797,900	"	35.6	4,678,000	60.4
France	1 267 700	"	7.8	187,100	2.4
Italy	866,000	"	5.4	1,132,100	14.6
U. S. A.	853,800	"	5.2	139,000	1.6
England	757,600	"	4.7	713,300	9.2
Finland	234,900	"	1.4	......	....
Switzerland	160,600	"	1.0	3,600	0.05
Poland	32,200	"	0.2	63,100	0.1
Czechoslovakia	26,400	"	0.2	3,800	0.05
Denmark	0,600	"	0.0	6,100	0.1
Norway	......	"	....	139,000	1.8
Austria	......	"	....	126,000	1.6
Japan	......	"	....	18,000	0.2
	16,262,900			7,785,000	

Switchboard from which power is distributed to the various units of the Chernorechenskaya carbide plant

The large increase from Germany is the result of the credits of 300,000,000 marks about ($75,000,000) granted to U. S. S. R. and probably represents in part the nitrate trade lost by Chile. The same effect is shown on the distribution of orders for chemical equipment.

Table II

Countries	*First Six Months 1930*	*Percentage*	*First Six Months 1931*	*Percentage*
Germany.......	4,092,000 rubles	50.7	7,911,000 rubles	87
France.........	1,738,800 "	21.7	17,100 "	0.2
England........	1,319,000 "	16.3	810,500 "	8.9
U. S. A.........	793,100 "	9.8	195,200 "	2.1
Czechoslavakia..	57,800 "	0.7	32,200 "	0.4
Sweden.........	30,600 "	0.4	95,900 "	1 00
Switzerland.....	28,100 "	0.4	..... "	....
Italy...........	2,500 "	0.04	38,000 "	0.4
Denmark.......	1,000 "	1.02	..... "	....

Soviet Chemicals on the world markets do not mean that home industries do not lack certain materials. Under present generally depressed trade sales of chemical products are comparatively more profitable than those of lumber and petroleum. And this explains the fact that Russia has been underbidding the world market in caustic soda, sodium sulphide, acetic acid and sodium acetate. Recently Sir Harry McGowan, Chairman of the Imperial Chemical Industries Limited complained of Russian competition in the British market. The following table illustrates the extent of the rate at which Russian exports are increasing:

Table III

	1929	*1930*
Soda..............	7.498 Metric Tons	31.437 Metric Tons
Potash............	3.597 " "	5.087 " "
Glycerine..........	5.413 " "	3.251 " "

During the first half of 1931 chemical exports increased 130% over the same period of 1930.

Due to the reasons we have mentioned above, Russian exports are not a precise indication of the success of the chemicalization. But there has undoubtedly been great progress and Russia is now manufacturing many types of chemicals imported before the war. The Soviets claim that production of chemicals is increasing rapidly as shown by the following tabulations.

	1928-29 Rubles	*1929-30 Rubles*
Heavy chemicals..................	104,104,000	145,403,000
Coal-tar products................	23,168,000	27,569,000
Aniline dye industry..............	42,509,000	59,606,000
Naval stores......................	14,725,000	20,249,000
Paints and varnishes..............	53,337,000	78,323,000
Bones and by-products............	16,309,000	18,524,000
Oils, cosmetics and fats...........	214,683,000	255,958,000
Match industry...................	42,535,000	57,289,000
Drug and fine chemical products.....	42,202,000	63,074,000
Miscellaneous....................	31,435,000	60,527,000
Total........................	585,007,000	786,522,000

Production of Heavy Chemicals(x)

	1928 Tons	*1929 Tons*	*1930 Tons*	*1931 Planned Tons*
Sulphuric acid 100%...	198,800	263,700	370,000	728,500
Caustic soda..........	58,400	64,300	75,000	125,000
Soda ash.............	216,200	235,800	270,000	357,000
Ground phosphate	40,000	76,100	260,000	1,114,000
Superphosphate.......	155,400	231,200	440,000	1,112,000

(x) According to the Planovoye Khoziaistrvo, Moscow.

Company Booklets

Atlas Powder Co., Wilmington, "Geophysical Prospecting with Explosives and the Seismograph." Published for a three-fold purpose: first, to inform all interested parties of the history and background of this comparatively new means of exploring for minerals; second, to supply elementary aspects of theory involved in use of the seismograph and part played by explosives of various types and of detonating agents; third, to provide detailed information on Atlas brands of explosives that are adaptable for this work.

J. T. Baker Chemical Co., Phillipsburg, N. J. "The Chemist Analyst" January number contains a very excellent article on an improvised Victor Meyer apparatus.

Columbia Alkali Corp., Empire State Bldg., N. Y. City. "Columbia Liquid Caustic Soda". An extremely valuable booklet describing the economies of liquid versus flake or solid caustic. A booklet that should be in the hands of every caustic purchaser and also operating officials of plants where alkalies are used in any quantity.

Diamond Alkali Co., Pittsburgh. A four page leaflet in a series describing Diamond alkalies and service.

Eastman Kodak Co., Rochester, N. Y. "Eastman Organic Chemicals List No. 23. Issued in January this price list supersedes previous lists.

Gustavus J. Esselen. "The Esselen Bulletin" discusses new process for producing synthetic rubber from rocks.

Hercules Powder Co., Wilmington. "The Hercules Mixer." An outstanding achievement in the field of house organs. January number contains symposium on prospects for 1932 by managers of various Hercules and Papermakers divisions.

Merck & Co., Rahway, N. J. "Merck's Report and Price List". Quarterly review of news, market report, and general information of value to the pharmaceutical and fine chemical trades.

Monsanto Chemical Wks., St. Louis. "Monsanto Current Events." Newsy, intimate glimpses of Monsanto personnel on two continents.

National Aniline Co., 40 Rector St., N. Y. City. The December issue contains a very interesting account of the China flood written by A. R. Edwards, Hankow office.

Pfanstiehl Chemical Co., Waukegan, Ill. New 1932 catalog of rare sugars, amino acids, laboratory reagents, and biochemicals, announces sharp price reductions which in most cases are said to more than offset the severest cuts in "depression budgets."

Philadelphia Quartz Co., Philadelphia. "Silicate P's & Q's" for December gives a review of uses for soluble silicates published in 1931 and also a complete list of the various booklets issued.

Roessler & Hasslacher Chemical Co., Empire State Bldg., N. Y. City. "Sodium Perborate." A 14 page booklet describing in detail chemical and physical properties and uses for perborate.

Roessler & Hasslacher. January price list.

Rossville Commercial Alcohol Corp., Lawrenceburg, Ind. Rossville Talks for December discusses Alcohol and the coal tar industries.

Thompson-Hayward Chemical Co., 29th & Southwest Blvd., Kansas City, Mo. An 86 page booklet describing the history, policies, service, and chemicals made and distributed.

CHEMICAL

Photographic Record

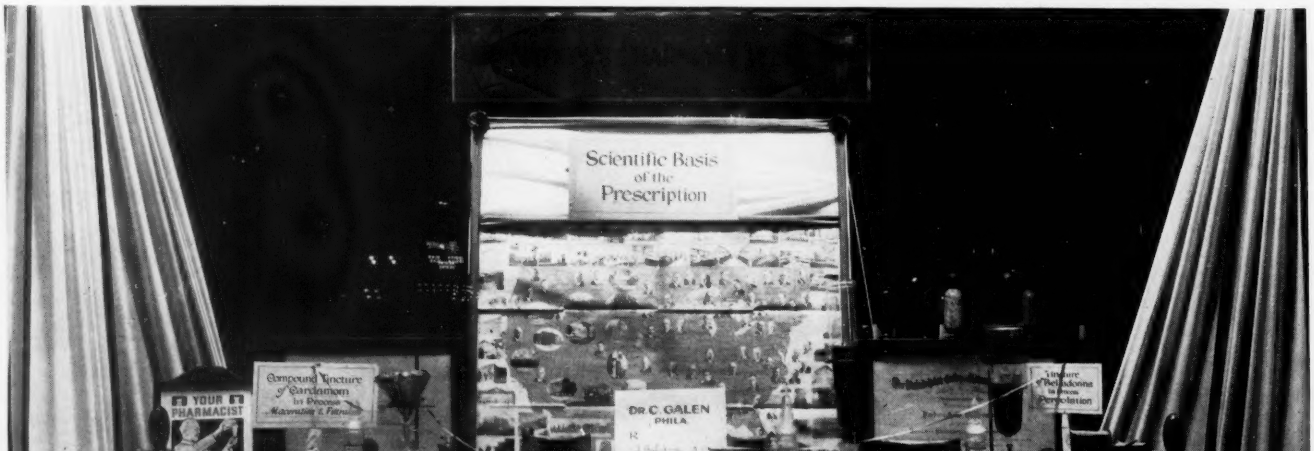
Halbran

Dr. C. F. Burgess, noted chemist, and his new "floating brick". Dr. Burgess Perkin Medalist for 1932 shows new brick that is likely to revolutionize building industry. Although it is light enough to float, such a brick has greater strength than any now in use

Knickerbocker

Employees of Foster D. Snell, Inc., Brooklyn are addressed at annual meeting by Leon V. Quigley on the subject "Building Business in Bad Times"

Professional Pharmacy window display of Haussmann Pharmacy, Philadelphia, Pa., judged the winner of the 1931 Pharmacy Week Window Display Contest, the prize award being the pharmacy Week Cup contributed by the Federal Wholesale Druggists Association



NEWS REEL

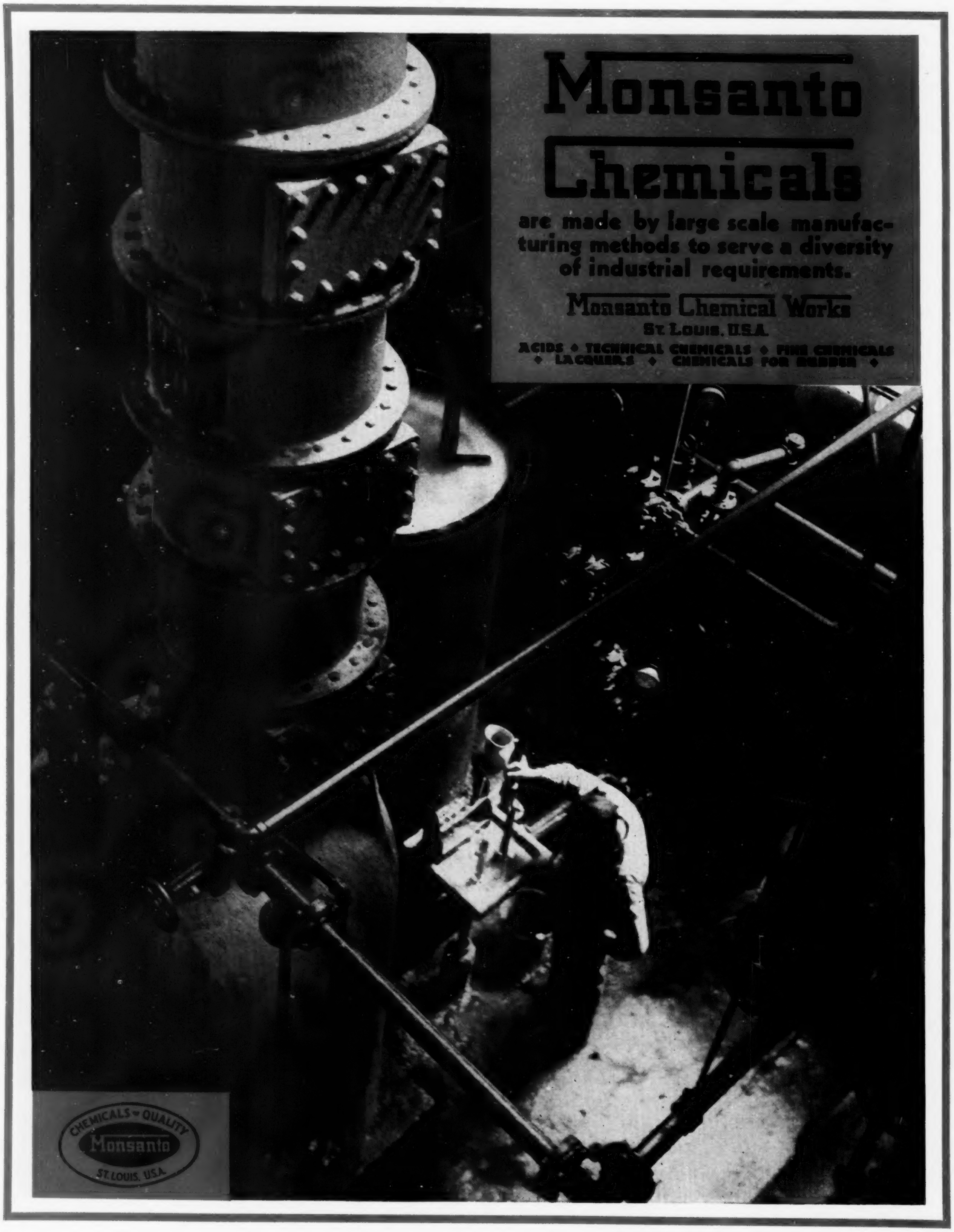
of Chemical Activities

Bakelite exhibit at the recent Motor Boat Show devoted entirely to new synthetic resins, which have met with such widespread acceptance as the basic element in super-quality marine finishes of all types. Included in the exhibit were a number of striking laboratory tests, demonstrating water, acid, and alkali resistance; elasticity; drying time, and other characteristics

Keystone

King Gustaf of Sweden presents the Nobel Prizes to the latest winners. Dr. Carl Bosch, noted German, co-sharer with Friederich Bergius, receiving medal in ceremony held recently in Stockholm

Merrimac proves the durability of Merrimac Airplane Lacquers on Company's own monoplane. This 4-place Stinson Jr. cabin monoplane acts in the dual capacity of affording fast transportation for company officials and also broadcasts the lasting qualities of one of Merrimac's special products



Monsanto
Chemicals
are made by large scale manufacturing methods to serve a diversity of industrial requirements.
Monsanto Chemical Works
St. Louis, U.S.A.
ACIDS ◆ TECHNICAL CHEMICALS ◆ FINE CHEMICALS ◆ LACQUERS ◆ CHEMICALS FOR RUBBER ◆
CHEMICALS OF QUALITY
Monsanto
ST. LOUIS, U.S.A.

A Lively Chemical Corpse

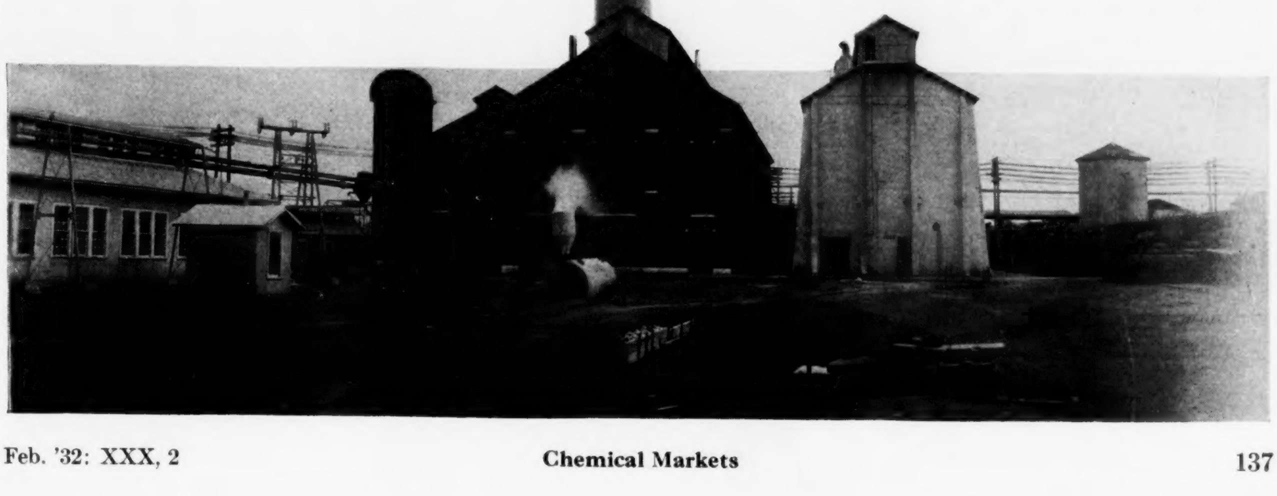
Erection and successful operation of the Crossett wood distillation plant, designed to have a capacity of 200 cords per day and employing an improved form of the Suida Process, refutes the wide spread belief that the ancient hardwood distillation industry is rapidly retreating before the inroads of synthetic production.

By Robert H. Brooks

WITH an acreage running into six figures of Crossett-owned hardwood timber lands, supplemented by available artesian water and adequate natural gas, as well as sawmill waste for fuel, the Crossett Chemical Company was launched in the wood distillation field a year ago as a logical companion enterprise to the manufacture of hardwood lumber. In keeping with the extensive character of its operations, the Crossett interests have erected at Crossett, Arkansas, a wood distillation plant—laid out to handle 200 cords of wood per day. Initial equipment was installed for a daily consumption of 100 cords, the remaining installations to be added as conditions require.

Plant operation functions by the Suida process, first installed in this country by the Forest Products Chemical Co., at Memphis. The inherent advantages of this method comprise a continuous process, giving a product of high concentration and purity with few separate operations, low steam consumption and use of oil distilled from hardwood tar as extraction agent, making the plant entirely self contained. At Crossett is ample yard room to allow air-drying of a certain amount of wood carried in stock, to smooth out seasonal and other variations in the supply. In order to use wood direct from the mill and eliminate carrying stock ten months' to permit air-drying, the moisture is controlled by a pre-drying with waste heat from the retorts, supplemented by burning tar in direct air heater. However dried, wood is loaded into buggies, four buggies, or ten cords, making a retort charge. Each charge stays in the pre-dryer 48 hours and in the retort 24 hours. During that 24 hour period the retorts are gradually heated to a temperature of 425° to 450° C. and the volatile products are led into water cooled condensers. The non-condensible gases are scrubbed to remove methanol and then burned under the retorts. The residue remaining in the buggies is charcoal.

To condition the charcoal, the buggies are drawn from the retort into closed coolers, of which there are two for each retort, where they remain for 48 hours. The charcoal next stands under a cooling shed for 48 hours and there it is dumped into bins where it stays for another 48 hours before being bagged for shipment. Altogether, it is eight days from the time a buggy is loaded before it is



empty, ready for loading again, and nine days before the charcoal can be shipped.

The feeder conveyor discharges on to an inclined belt leading to the charcoal bins and discharges onto a perforated metal plate, which allows the fine charcoal or "breeze" to fall through into a bin from which it is sacked up and stored 21 days before shipment. The lump charcoal passes onto a distributing conveyor over the storage bins which are filled in rotation and allowed to stand 48 hours before sacking.

The bottom of the bin slopes towards a narrow sacking table with a series of spouts to which the paper bags are attached and filled for shipment. The floor of the sacking room is flush with the deck of a box car for convenient loading.

Modification of the Suida Process

The chief products, in addition to charcoal, are methanol and acetic acid, although the preparation of oils and pitch is a necessary part of the process. Methanol is separated from other products by simple rectification while acetic acid is recovered by a somewhat modified Suida process. The pitch and oils are produced by vacuum distillation of the tar.

The pyroligneous acid or "raw liquor" from the retorts is allowed to settle. The tar is drawn off and steam distilled in a copper still. The distillate, is returned to the raw liquor storage tanks, and the dehydrated tar is distilled under vacuum. This distillate consists of oils with a boiling range from about 150° to 340° C. and of these the higher boiling fractions are used in the Suida process. The residue is hardwood pitch which may be produced with any predetermined flow point up to 100° C.

The raw liquor, free from settled tar is fed by a metering pump into a copper primary still, and is vaporized into the scrubbing unit. The heavy fraction of wood oil is fed by another metering pump into the top of the upper column, flowing countercurrent to the vapors from which it absorbs the acetic acid. Distillate from the top of the column is practically free from acid but contains the methanol water and some, of the oils present in the raw liquor. The acid-oil mixture from the upper column is dehydrated over steam coils in the lower column and feeds directly into the lower part of the vacuum unit. The acid is flashed off and rectified in the upper vacuum column. The product carrying 90 to 92 per cent. acetic acid by weight, is drawn from the column through a sight glass into aluminum receivers also under vacuum and from them transferred to an aluminum storage tank, ready for shipment. Coils in the lower vacuum column remove the last traces of acid from the scrubbing oil which is drawn out through a cooler and returned to the oil feed tank. Raw liquor which is vaporized in the primary still, leaves a residue of soluble tar which is periodically steam distilled. The distillate is returned to the raw liquor storage and the tar residue is used for fuel.

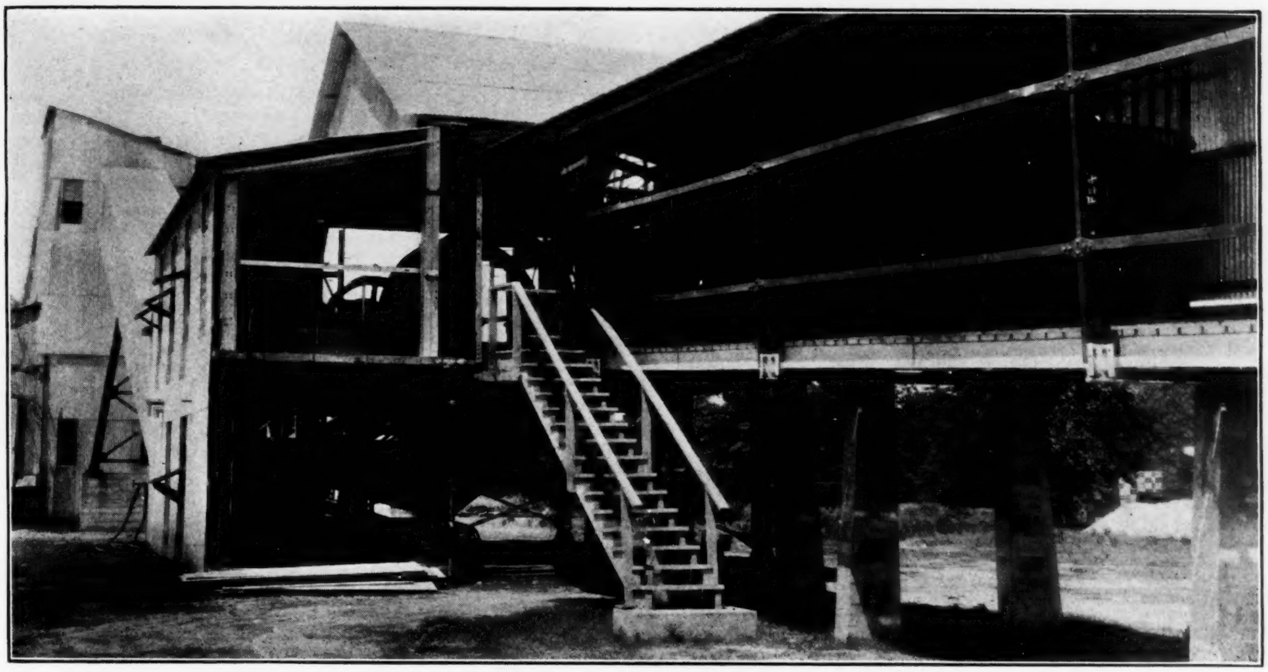
Process is Continuous

The weak methanol from the top of the scrubbing column is rectified to about 90 per cent Tralles in a continuous still, and then refined by chemical treatment and redistillation.

All these processes are continuous with the exception of tar distillation and one operation in refining the alcohol. Since satisfactory continuous operation depends on accurate control in all parts of the system, particular attention was given to this feature.

Plant equipment is all of the most advanced type and approved material. The steam and water mains

The entrance of the Crossett interests into the production of methanol and acetic acid was a most logical step. Abundance of company owned timber, plenty of water, and an abundance of natural gas assures continuous operation



Production costs have been reduced by the adoption of several radical improvements of the Suida Process. Picture shows the charcoal tipple

are amply large to allow for future increase in capacity and permit regulating the supply to the different units without disturbing the pressure in the system. Well water at 100 pounds pressure and at a constant temperature of 61° Farenheit is pumped from the central power house.

All piping valves handling concentrated acid are of aluminum. Liquor piping is made of flanged copper tubing with bronze valves. Pump parts, coming into contact with the liquor, are of ordinary phosphor bronze, containing 75 per cent copper. All columns are of the plate and bubble cap type, with the plates bolted between flange sections. The bubble caps, of cast bronze, have tangential slots. The efficiency of this type is such that a 20-plate scrubbing column can be used, where European plants use a 60-plate column. Condensers are of the tubular type. Water inlets on all condensers are cross-connected to the overflow lines, to provide easy cleaning and maintenance.

Control of Operations

A well equipped laboratory, which may be considered an operating control department, makes routine analyses at various stages in the process, checks operators' daily reports, and tabulates the results of each day's operations. The laboratory is also responsible for the accuracy and operation of all recording and controlling instruments. In this laboratory, a method of preparing better oil for the Suida process, has been worked out, reducing oil consumption nearly half, and giving better recovery of acid.

Aside from the profit-earning possibilities of the chemical plant, its establishment fits in with the broad constructive policies of the Crossett-Watzek-Gates interests which control it to follow consistently, systematic conservation practices which will not only utilize every element made available, but also provide for the periodical re-growth and restoration of those resources from year to year. Unlike many wood-working enterprises, Crossett's will be in perpetual operation.

Garvan Honored

Francis P. Garvan, president, Chemical Foundation, elected president of the United States Institute for Textile Research, Inc., at a meeting of the directors, Jan. 22 at the Chemists' Club. He succeeds the late Dr. Samuel W. Stratton, who was the first president of the research organization and a former president of the Massachusetts Institute of Technology.

Other officers elected were:—Vice-presidents, A. F. Bemis, Boston; W. Robert Blum, Lodi, N. J.; H. V. R. Steel, Passaic, N. J.; Thomas T. Clark, North Billerica, Mass.; and K. T. Lewis, Durham, N. C.; treasurer, Ernest N. Hood, Salem, Mass.; secretary, Charles H. Clark, Boston.

Editor's Correspondence

January 20, 1932.

Chemical Markets:

I would like to inquire in a good-natured sort of way, whether you are holding up anything particular against me. I note on page 49 of the January number that you have omitted my name from the list of members of the Committee on Technological Unemployment of the American Institute of Chemical Engineers. You must even have forgotten that it was I who told you about this committee and its activities when I had the pleasure of a brief visit with you at your office last fall.

I have just checked over the list of the committee who published the report and find that you also omitted the name of William C. Geer.

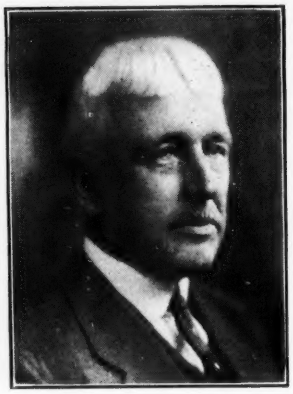
GUSTAVUS. J. ESSELEN,

Boston, Jan. 20, 1932.

Note: We regret the omission, which was of course unintentional, of the names of both Dr. Esselen and Dr. Geer.

Safety Factors in Methyl Chloride Refrigeration

By J. B. Churchhill



REFRIGERATION prior to 1900 showed instances of the use of substances other than ammonia or carbon dioxide as refrigerants, and even at that date the chemical substances recorded as refrigerants would perhaps include thirty or forty different compounds. With the exception of ammonia and carbon dioxide, however, the amounts were too small to be of importance to manufacturers.

As the field for refrigeration constantly widened, the engineer was obliged to keep apace with this and to direct his efforts more and more to the design of refrigerating equipment peculiarly adapted to special purposes. He found himself confronted with the problem of taking up heat at both higher and lower temperature planes than had hitherto been customary. He was called upon for the construction of systems of small capacity to supply the ever-growing demand for refrigeration to replace the use of natural ice in the small store and market. Our chemical industries especially those engaged in the production of large quantities of liquified hydrocarbons and also in the manufacture of photographic films, required temperatures lower than had ever been thought feasible in former commercial practice, and today we find some of the very largest users of refrigeration among such industries.

The application of refrigeration to domestic and small commercial uses brought a demand for systems whose operation was wholly automatic and where freedom from service was perhaps the first requisite for success. Later still the spectacular developments in the fields of air conditioning and the cooling of theatres and dwellings, as well as the advances made within the last few years, in the application of the quick freezing processes, to the preservation of food products, have also brought entirely new types of refrigerating equipment into the field.

Along with this mechanical progress the engineer had to select that chemical substance best suited for his specific purpose as a refrigerant. This need has resulted in a study of the physical and chemical properties of many chemicals not before considered as possible or even desirable as refrigerants, many of them were found well adapted for the new requirements and we find that while in 1900 practically, only two compounds, were used. Today we have some twelve different chemicals well recognized as useful refrigerants and used in sufficient quantities to be a factor in the chemical market.

With the increase in the number of refrigerants, the question of what constitutes the desirable properties of a satisfactory refrigerant, became more and more a subject of discussion.

The question has often been asked "What would constitute an ideal refrigerant". Dr. Ward Evans discusses this question in an interesting paper appearing in the November, 1931 CHEMICAL MARKETS and very clearly answers the question as to the possibility of any substance being considered as an ideal refrigerant for all purposes. It is evident that the best that can be hoped for along this line lies in the selection of that substance which possesses the necessary chemical, physical and toxic properties which will enable it to most nearly fulfill the ideal requirements for the specific purpose for which it is to be used. We must take into consideration, not only its use in relation to the refrigerating system itself, but also the conditions under which the refrigeration is to be applied. Among refrigerating engineers, we would probably find a considerable divergence of opinion, as regards the importance of the various characteristics unless both the mechanical detail of the system in which it was to be used and the specific conditions under which the refrigeration was to be applied be definitely known.

Without attempting to list all factors in the selection of a refrigerant we might consider the following to be of general importance:

1. It should be non-corrosive to any material used in the construction of the refrigerating system with which it can come in contact.
2. The displacement per ton of refrigeration must be such as to allow a reasonable construction of the compressor or prime mover, both as to size and with due consideration for the minimizing of friction losses.
3. The relation between the latent heat of evaporation and the latent heat of liquid should, under general conditions be such that the heat taken up in the evaporator shall be a maximum per unit of displacement of the compressor.
4. The pressure temperature relations should be such that necessary temperatures can be produced in the evaporator without impairing the efficiency of operation, and with many of the conventional types of machines, it is desirable to select a refrigerant whose boiling point is such that the suction pressures will always be positive.
5. It must be stable and incapable of decomposition under any temperature existing in the system.
6. It should not decompose or hydrolyse into corrosive substances in coming in contact with water or moisture which might be accidently introduced into the system.
7. The toxcity, flammability, and explosive range when mixed with air, should all be as low as is compatible with practical considerations.
8. It should not decompose when coming in contact with an open flame into highly toxic or irritating substances.
9. It should have no chemical action on the oil used for lubrication.

Obviously this list of desirable properties might be considerably extended, but sufficient has been given to indicate that no single refrigerant can be considered as "ideal" in general, or entirely satisfactory and free from all objectionable properties even when selected as especially suitable for some specific use. It cannot be too strongly emphasized that the relative importance of any inherent characteristic that a refrigerant may possess depends almost entirely upon the mechanical construction of the equipment and the conditions surrounding its use.

Before 1910 refrigeration was almost entirely confined to large operations and moderate sized commercial equipment. The hazards involved were confined to the employees of such plants and were entirely occupational in character. With the application of mechanical refrigeration to domestic purposes in homes and apartment dwellings, the question of safety has become more and more important, and the hazard involved became one of an occupancy rather than an occupational risk.

Safety in refrigeration is much too broad a subject to discuss at this time in detail. The writer wishes to point out that serious accidents have occurred in the past, many resulting in fatalities, and that these accidents have occurred with refrigerating equipment using practically all of the generally recognized refrigerants.

In practically every case the primary cause of these accidents could be traced to bad engineering in the construction of the equipment, rather than to any property of the refrigerant itself. It must be borne in mind that all refrigerants are more or less toxic and can cause injuries to health and loss of life if leakage takes place in sufficient quantities to produce dangerous concentrations in surrounding air.

History of the Code Committee

Such occurrences resulted first in much discussion of this subject, which some twelve years ago brought about the formation, by the American Society of Refrigerating Engineers, of a Safety Code Committee. This Committee cooperated with the New York Fire Department in the formulation of a Safety Code for the City of New York. Later, a Sectional Committee was appointed under the procedure of the American Standards Association with the Refrigerating Engineers acting as sponsor body. This Committee was a joint technical committee representing thirty different organizations concerned in every phase of refrigeration and public safety. Its personnel at the present time consists of some forty individual members.

After years of research and study, the Committee formulated the present Safety Code for Mechanical Refrigeration, approved as an American Standard in October, 1930.

This Code lists the following chemicals as approved refrigerants: carbon dioxide, ethane, ammonia, methyl chloride, sulfur dioxide, isobutane, butane, ethyl chloride, dichloromathane, dichloroethylene and trichloroethylene.

This Code formulates the restrictions and precautions necessary to observe in the operation of all types of systems using any of the above listed refrigerants.

Operating under the regulations of this Code it is unlikely that any of the unfortunate accidents of the past, would re-occur. It cannot be too strongly stated that if the refrigerating equipment had been installed in strict conformity with the regulations of this Code, none of the accidents just referred to would have probably taken place. The Code gives a reasonable assurance of "safety" to the public and it has been the endeavor to formulate its regulations in such a manner as to avoid placing any unjust hardship on the manufacturer or the public.

Since its approval it has formed the basis of a number of similar codes which have been drawn up and approved by several of our large cities. It is to be hoped that it will be adopted as the nation-wide standard and thus assure uniform regulations for "safety" in the refrigeration industry throughout the United States.

During the past two years there has been published, sometimes by individuals and sometimes by associations, much that has been misleading and untrue concerning the properties of refrigerants and the comparative dangers encountered in their use. Two examples may be given here: The first is a Table

appearing in the November, 1931 issue of CHEMICAL MARKETS. This table is based, to some extent, on a similar Table appearing in the June 7th, 1930 issue of the Journal of "The American Medical Association. The article in which this Table appears was written by Dr. Ward Evans and entitled "What Is The Ideal Refrigerant?" This Table rates the relative merits of a number of different refrigerants, the number one indicating the best rating for a specific property. This Table, insofar as it applies to those refrigerants under discussion is reproduced as follows:

	Ammonia	*Butane*	*Carbon Dioxide*	*Ethyl Chloride*	*Methyl Chloride*	*Sulphur Dioxide*
Immediate toxic effects	6	1	2	3	5	7
Delayed toxic effects	1	1	1	1	1	1
Delayed toxic effects	1	1	1	1	7	1
Flammability	4	7	1	6	5	1
Efficiency	2	5	6	2	4	1
Pressure developed	6	2	7	1	4	3
	19	16	17	13	25	13

Journal of the American Medical Association, June 7, 1930. Vol. 94, pp. 1832-1838 and 1842 and 1843.

Comparison of Tables of Ratings

The impression given by this tabulation is entirely misleading; methyl chloride would appear from the above rating to be the least desirable refrigerant, both from an engineering and safety standpoint. This conclusion is contrary to all known facts. It may not be out of place to reconstruct this Table, giving the facts concerning the properties of each refrigerant as far as is possible.

After comparing the two tabulations, the unfairness of the method of rating is evident. Taking the headings as given in the first Table, the writer comments as follows:

1. *Immediate Toxic Effect.* Methyl Chloride must be considered as having a comparatively low relative toxicity thirty times the concentration by volume, is necessary to kill quickly when compared to Ammonia, and seventy-five to one hundred and fifty, when compared with Sulfur Dioxide. Compared with gasoline, Methyl Chloride is the less toxic.
2. *Delayed Toxic Effect.* As far as the writer is aware, there is little or no reliable evidence upon which to base the rating given methyl chloride in this Table.
3. *Flammability.* The flammability of methyl chloride is low and properly used as a refrigerant the hazard from fire or explosion is remote.
4. *Efficiency.* The figures given for the theoretical horse-power necessary to produce one ton of refrigeration, show that with the exception of carbon dioxide whose critical point is low, the efficiency of the refrigerants listed is practically equal.
5. *Pressures Developed.* From the standpoint of the refrigerating engineer designing equipment for household purposes, the range of evaporator temperatures possible with methyl chloride without operating with suction pressures below gauge and at the same time maintaining head pressures that are reasonably low, gives methyl chloride a distinct advantage.

The following paragraph is quoted from an article appearing in the November 11th, 1931 issue of the "Nation". This is entitled, "Government Bureaus for Private Profits." Its author, F. P. Schlink, is Technical Director of Consumers Research, Inc.

"The Bureau of Mines favored the manufacturers with a practical and useful report also in the case of methyl chloride, a deadly poisonous substance used under high pressure in electric refrigerators, which has already snuffed out many lives without warning. Using the prestige of the government's report, which all but a small number of persons would assume to be almost entirely free from bias, a manufacturer of this poison, by careful selection of material and suppression of unfavorable findings, issued advertising which to a non-technical reader or even to a slightly credulous technician appears to prove that methyl chloride was governmentally and officially shown to be a relatively harmless substance, and indeed the last word in efficient and safe refrigerant gases. Since the government issued no public

Refrigerant		*Ammonia*	*Butane*	*Carbon Dioxide*	*Ethyl Chloride*	*Methyl Chloride*	*Sulphur Dioxide*
Kills most animals in a very short time Percent by Vol.	(1)	0.5–1%	......	......	15–30%	15–30%	0.2%
Dangerous in 30 to 60 minutes Percent by Vol.	(1)	0.25–0.45%	......	......	6–10%	2–4%	0.04–0.05%
Flammability		Low	High	Non-Flammable	High	Low	Non-Flammable
Explosion Limits With Air	(2)	13.1–26.8%	1.65–5.7%	Non-Combustible	4.3–14.0%	7–21%	Non-Combustible
Efficiency Theoretical Horsepower Per Ton at 5° and 86° F.	(3)	0.977	0.970	1.238	......	0.970	0.960
Suction and Head Pressures at Standard Ton Conditions In Pounds Gage	(4)	5° 86° 19.6–154	5° 86° *13.2–26.9	5° 86° 391–1024	5° 86° *20.1–12.4	5° 86° 6.2–80.8	5° 86° *5.9–51.8

*Inches of Mercury below gage.
(1) U. S. Public Health Bulletin No. 185.
(2) Properties of Refrigerants A. S. R. D. Circular No. 2.
(3) W. H. Carrier and R. W. Waterfield, Refrigerating Engineering, January, 1924, pages 415 to 420.
Also Refrigerating Engineering, September, 1931, page 173

condemnation of this atrocious misuse of its data, as its officers were in all decency bound to do, and as they do not do in these business-like days, the scientists who reported the findings later distorted by commercial interests functioned to all practical purposes as silent partners in a campaign of tricky advertising—and that in a field involving exceedingly serious hazards to the lives of thousands of citizens."

In this the author insinuates that the Bureau of Mines in their reports dealing with methyl chloride have been influenced in their findings by the manufacturer. Two reports have been issued by the Bureau of Mines on the subject. The first, "Public Health Bulletin 185" gives accurate data on the toxicity of methyl chloride; and the second, "Public Health Report No. 19, Vol. 45" treats of the possibility of methyl chloride poisoning by ingestion with food and water.

These investigations were made by the Bureau of Mines with the purpose of furnishing definite and accurate data on the toxicity of methyl chloride. The scope of the work was strictly limited and the results were both accurate and definite.

High Type of Work Done by Bureau

The work of the United States Bureau of Mines needs no advocate. No one in a position to know the quality of the work of this Bureau would dream of questioning the sincerity of its findings. The inference that the findings of the Bureau of Mines could be the slightest degree influenced by the fact that the work was done under a "cooperative agreement" can only be regarded as a reflection on those who made it.

He states that "methyl chloride is a deadly poisonous substance . . . . . . that has already snuffed out many lives."

Nobody connected with the refrigeration industry wishes to minimize or deny the unfortunate accidents which took place in the city of Chicago. In some of these cases considerable doubt must exist as to the actual part methyl chloride, or even the refrigerating system, played as a primary cause of the casualty reported. In a number of these cases, however, there can be no doubt that methyl chloride was the direct cause. It must be kept firmly in mind, however, that all of the Chicago cases occurred where methyl chloride was used in multiple systems and where the amount of refrigerant involved was large. Such systems have been condemned as unsafe by practically all of the older and more experienced refrigerating engineers, many of whom predicted that failures of such systems would take place and that fatalities would be the result of such failures.

The blame for these accidents must be ascribed to the use of a refrigerating system inherently dangerous in its engineering characteristics, rather than to the use of any specific substance as a refrigerant. It must be taken into careful consideration that the users of methyl chloride have purchased this material at several times the cost of other refrigerants because they believed that methyl chloride gave them the greatest safety factor.

It might be noted that if any other refrigerant whose use would have been possible would have been employed the results might have been far more serious. No accident resulting in injury to life or health has occurred where methyl chloride has been used as the refrigerant in strict accordance with either the New York City or the American Standards Code. The number of household machines using methyl chloride number in the hundreds of thousands.

He states that the manufacturers have misused the data furnished by the Bureau of Mines.

The pamphlet in question is entitled "Artic—The Refrigerant—Its Physical and Physiological Properties and Performance Data" (Technical Paper No. 274) issued in September, 1930, by the Roessler & Hasslacher Chemical Company. This pamphlet was put out by the manufacturers in order to give the refrigeration industry as complete a knowledge of the physical and physiological data regarding methyl chloride as could be reasonably expected in a publication of this sort devoted entirely to the description of one chemical substance. To the writer's knowledge this pamphlet embodies the most complete and reliable information ever presented by the manufacturer of any chemical substance used as a refrigerant.

No attention is paid to the paragraph published in "Artic" on pages 10 and 11 quoted here in full: "Insufficient evidence is available at present to make a positive statement as to the cumulative effect of methyl chloride. There are a number of instances which lead us to believe that small concentrations of Artic can be breathed over a long period without any serious effects. But in general it must be understood that all gases except pure air, are more or less toxic or asphyxiating, and breathing them is always to be avoided. Adequate ventilation should be provided wherever volatile liquids or gases are used."

Advantage of An Odorless Refrigerant

There has been criticism of the use of refrigerants such as methyl and ethyl chloride, etc., which are so nearly odorless as to render detection difficult. In the writer's opinion the use of an odorless and non-irritant refrigerant, is a very distinct advantage, provided that the amount of refrigerant used is such that no injury to life or health would result if the total charge contained in the system suddenly leaked into the surrounding air. It is obvious that the use of an odorless refrigerant gives assurance against a panic in case a leak occurred into a space occupied by a large number of people; such for instance, as a cafeteria, soda fountain, etc. The use of an odorless refrigerant also has very great advantages in the fact that equipment can be serviced without risk of causing annoyance to the occupants of the dwelling or space where the machine is located.

Barium Compounds—

Their History, Preparation, and Uses Briefly Summarized

By Dr. W. Tranton

PRACTICALLY all barium compounds are products from two raw materials, namely, witherite or barium carbonate and barytes, generally known as heavy spar, consisting of barium sulfate.

Until recently, barytes was nearly always worked as a side-line in the search for galena, but the low value obtained for lead in the last few years has made lead mining in many districts unprofitable and it has become necessary, and in future will become more necessary, to search for barytes for its own sake. The largest deposits of barytes are found in Germany, which furnishes by far the greater quantity of barytes used in industry, exporting large quantities to America, France, Belgium, Holland, and Great Britain. Several of the deposits in the Hartz mountains are very extensive and of a very pure quality and of good colour—a product containing 97—98½% barium sulfate can be got straight from the mine without any grading or purification.

When war broke out in 1914 there was a great scarcity of barium products in many parts of the world and barytes mining was resumed in many districts which had hitherto been abandoned owing to the inability to compete with the cheap and high-grade material which had been procurable from Germany. In America the production of crude barytes increased from about 18,000 tons per annum to about 70,000 tons—this production has been maintained by the protection of the industry by the imposition of tariffs, but even today America is a very large importer of barium compounds of all kinds; in 1929 nearly 30,000 tons were imported.

The mining of barytes is much the same as the mining of any non-ferrous metal which occurs in the earth's crust in lode or vein form. Levels are driven along the direction of the lode at intervals of 100 ft. vertically and the ground so opened up is cut away, starting from the lowest level and working gradually up to the next level above, so that all the barytes ore comes away from the working faces in the stopes by gravity. The broken ore is trammed along the levels to bins at the shaft and from these it is filled into the skip and hoisted to the surface and transported to the works for further treatment. Here it is passed through a washing plant composed of crushers, trommels, jigs, and concentrating tables and the country rock separated from the ore. The resulting products are classified according to their colour and purity into the various grades for which they are most suited. The grades are thereafter kept separate and passed through the remainder of the treatment in batches of 50—75 tons.

From the washing plant the barytes is passed through a rotary gas-fired dryer, the temperature of which is varied according to the grade being treated. The lower grades are dried only and the temperature then does not exceed 400—500° C. For the production of the higher grades, such as No. 1 white, the temperature of the dryer is raised to about 900—1000° C.

A useful property of barytes is that when pure it will decrepitate at such a temperature to a fine powder but if there is any admixture of impurity with it the barytes so contaminated will not break down. So that after furnacing, the resultant product is a mixture of fine, almost pure barytes powder and coarse lumps of impure barytes. This product is sieved through a 20-mesh hummer screen and the fines passed on to the bleaching plant and the coarse relegated for re-treatment or used for one of the lower grades.

The higher grades after decrepitation and screening pass to the bleaching plant where they are bleached in steam jacketed rubber lined bleaching pots. Hydrochloric acid is diluted to the required strength and brought to the boil in the bleaching pot, the barytes is then poured slowly into the boiling acid so that the temperature is not reduced and the barytes boiled in the acid for two hours—the pot is then slowly tipped and the acid poured off. After all the acid has been removed, the pot is tipped further and the barytes washed out with a hose and passed over concentrating tables where it receives three separate washings with clean water and at the same time any solid impurities which have been freed in the bleaching process are removed. The purified barytes is drained and dried

Abstract of paper delivered before Liverpool Section, Society of Chemical Industry.

and ultimately ground in stone mills and passed through air separators to get a product which will pass a 300 mesh.

Barytes enters into the manufacturing operations of many industries and trades, such as the paint, rubber, electrical, phonographic industry, building trade, textile industry, and chemical industry. It is a component of almost every kind of paint and putty, and its use in this industry is extending. In the rubber industry it is used as a filling or compounding material and very large quantities are consumed in this way. In the electrical industry it is used in insulating compositions, cable fillings, etc., and the development of this industry will call for further supplies.

Slabs made of barytes are being used in building construction as a protective material in the construction of the walls of X-ray rooms. The composition of the slabs best suited for the purpose is one part of rough sand, one part ground ashes, one part Portland cement, three parts barytes. The slabs are of such a thickness as to weigh 37½ lb. per superficial foot. The walls are finally coated with ⅝-in. coat of barytes plaster, and then afford an amount of protection equivalent to that given by sheets of lead 4-mm. thick.

Quantities of ground barytes are used in the sizes employed in the finishing processes for textile goods and for weighting of cotton goods and leather. The oil industry purchases very large quantities of ground barytes to be employed in the sealing up of abandoned oil wells, to prevent the wastage of gas and oil which occurs as the proportion of gas to oil becomes too large. One contract alone for this purpose amounts to 50,000 tons per annum, so soon it may be necessary to look for our supplies of barytes at the bottom of the disused oil wells.

Chemical Industry Large Consumer

The other large consumer of witherite and barytes in the crude form is the chemical industry for the production of barium compounds of all kinds, such as barium chloride, nitrate, carbonate, blanc fixe, barium hydrates, barium peroxide, and lithopone.

Witherite being soluble in dilute hydrochloric acid is a handy raw material for the production of barium chloride. The process is quite simple—dilute HCl is circulated through a bed of crude witherite and when completely neutralized the solution is allowed to settle and after concentration the barium chloride is separated by crystallization. It is used in the dyeing industry for the production of lake colours. In the textile industry it is used to a small extent as a weighting material. Certain quantities of barium chloride are used in some boiler feed water compositions, and some as an insecticide and poison for vermin. In the aggregate there must also be a fairly large quantity used in analytical work as a reagent.

Barium nitrate is usually produced by mixing a solution of barium chloride with sodium nitrate and separation of the barium nitrate by crystallization. At one time barium nitrate formed the raw material for the production of barium oxide and large quantities were used for this purpose, but owing to the scarcity of nitrates during the early years of the war this process had to be abandoned in favour of a much more economical one to which I will refer later. Practically the only use for barium nitrate on the large scale today is in the manufacture of green flares and fireworks generally.

Preparation of Blanc Fixe

A considerable tonnage of barium chloride is used in the making of the highest qualities of precipitated barium sulfate or blanc fixe. A filtered solution of barium chloride is precipitated with sulfuric acid under varying conditions of temperature and concentration according to the size of the granulation of the precipitate required. Blanc fixe in paste form is used in the paper industry for helping to produce highly glazed coated papers. It is also used in the dry form in the paint trade where a higher quality product is required than can be got from the ground barytes, and also as a base for striking colours on.

The first step in the production of other barium compounds is to get one which is soluble in water. This is achieved by furnacing a mixture of ground barytes and coking slack in a reducing furnace when crude barium sulfide is obtained. The reduction is generally carried out on a large scale in revolving furnaces similar to those used in the making of black ash. It is very important for this process that the barytes should be as free as possible from silica, as otherwise barium silicates are formed which are insoluble in water, and the yield of barium sulfide is considerably reduced.

In practice the loss is not directly proportionate to the silica content, as owing to the tendency of barytes containing over 5% of silica to flux, considerable quantities of barytes get occluded in the barium silicate and cannot be satisfactorily reduced to barium sulfide. In connection with this matter it is of the highest importance that barytes should contain no trace of fluorspar.

As barium sulfide is so very readily oxidizable, it has to be kept as much out of contact with air as possible, and if required for sale must be packed immediately it is sufficiently cooled for this purpose.

If the barium sulfide has to be converted into other barium products on the site it is dissolved as quickly as possible in distilled water and the solution settled and filtered. From this solution precipitated barium carbonate can be made by treatment by carbonic acid gas under pressure, the sulfuretted hydrogen given off being either recovered as sulfur in a Claus kiln or burned in a suitable burner and the SO_2 formed used for the purpose of making sulfuric acid. Large quantities of sulfuric acid were produced in Germany during the war period by this process and the barium

carbonate which was made in excess of local requirements was stored and disposed of gradually after the war was over.

Instead of preeipitating with carbonic acid gas a solution of sodium carbonate can be used, in which case an equivalent quantity of sodium sulfide is obtained, which after being separated from the barium carbonate by filtration is recovered by evaporation and crystallization.

Precipitated barium carbonate is used in quantities in the ceramic industry in the production of fine glazed bricks and tiles. The natural clay used as a raw material for this purpose nearly always contains a considerable amount of sulfate of lime, which, being slightly soluble in water, wanders to the outside of the bricks on drying and forms a white scum giving these a very objectionable appearance.

If precipitated barium carbonate is added to the clay in amount equivalent to the sulfate of lime present, then double decomposition takes place with the formation of barium sulfate and carbonate of lime, and as both these compounds are practically insoluble in water they remain evenly distributed throughout the brick and do not wander to the surface of the bricks on drying, as is the case with the sulfate of lime.

Freshly precipitated carbonate of barium is also used on a large scale for the removal of sulfate of lime from brine. Ordinary brine as pumped from the salt beds contains about 6 g. of sulfate of lime per litre. The whole of this can be completely removed by agitating the brine for a few minutes with the theoretical amount of freshly precipitated carbonate of barium, leaving a pure solution of sodium chloride and a mixed precipitate of barium sulfate and carbonate of lime. This product after being washed free from the sodium chloride is recovered in the form of a thick paste by separation in a centrifuge and used in this form in the paper coating industry for the production of matt art papers. What is not needed for this purpose is completely freed from moisture in a suitable drying plant, and in this form finds considerable outlet in the paint and rubber industries. The barium sulfate and carbonate of lime obtained in this way are so intimately associated that one might go as far as to say that they exist in the form of a double salt and the product has properties quite different from what is obtained by mixing precipitated sulfate of barium with precipitated carbonate of lime. For instance, the product is easily filterable although precipitated in the cold, which is, of course, not the case with ordinary precipitated barium sulfate.

Precipitated barium carbonate is used in the manufacture of barium oxide with subsequent conversion into barium peroxide and barium hydrate. This is the process previously referred to as superseding the process from barium nitrate.

The barium carbonate is first converted into barium oxide by mixing it with finely divided carbon and roasting the mixture in crucibles in specially-designed furnaces, the barium oxide obtained being then converted into barium peroxide by heating in a suitable temperature in a current of dry air. This is, of course, the foundation of the original Brin process for making oxygen, but this process has been superseded and commercial oxygen is now practically all made either electrolytically or from fractional distillation of liquid air.

Hydrogen Peroxide Manufacture

Barium peroxide is required in the preparation of hydrogen peroxide, the consumption of which is increasing annually. For this purpose the barium peroxide is suspended in water and decomposed with dilute sulfuric acid in the cold with the formation of barium sulfate and hydrogen peroxide, the hydrogen peroxide is separated by filtration and the barium sulfate sold as a second grade blanc fixe, as by this means it is not possible to get the precipitated barium sulfate sufficiently pure and of the requisite texture for blanc fixe of the highest quality.

An improved process has recently been worked out, whereby barium peroxide is first decomposed with phosphoric acid and the hydrogen peroxide separated from insoluble barium phosphate by filtration. The barium phosphate is then treated with an excess of phosphoric acid in which it dissolves, the solution settled, the barium precipitated as sulfate by treating with sulfuric acid, and the liberated phosphoric acid filtered off and used again in the first stage of the process. By this means it is possible to produce a much higher quality of blanc fixe than can be produced by direct treatment of barium peroxide with sulfuric acid.

Sometimes in the furnacing of the barium carbonate a barium oxide is got which is not sufficiently porous for the subsequent production of barium peroxide. When this happens the barium oxide is converted into barium hydrate by dissolving in water and the barium hydrate separated by crystallization. Large quantities of this material are used in the beet sugar industry.

By treatment of molasses with a solution of barium hydrate an insoluble barium saccharate is formed which can be separated from the non-sugar portion of the molasses. The barium saccharate is then suspended in water and decomposed by passing a current of carbonic acid gas through it, the carbonic acid being obtained either by an ordinary lime kiln or by using washed flue gases. The barium carbonate precipitated is separated by filtration and washing from the sugar solution, and after being dried is ready for reconversion into barium hydrate according to the method already described. The amount of barium carbonate required in this process is represented by the process loss in the conversion of the recovered barium carbonate to barium hydrate.

Next to ground barytes the barium compound used on the largest scale is that commercially known as lithopone or Orr's zinc white.

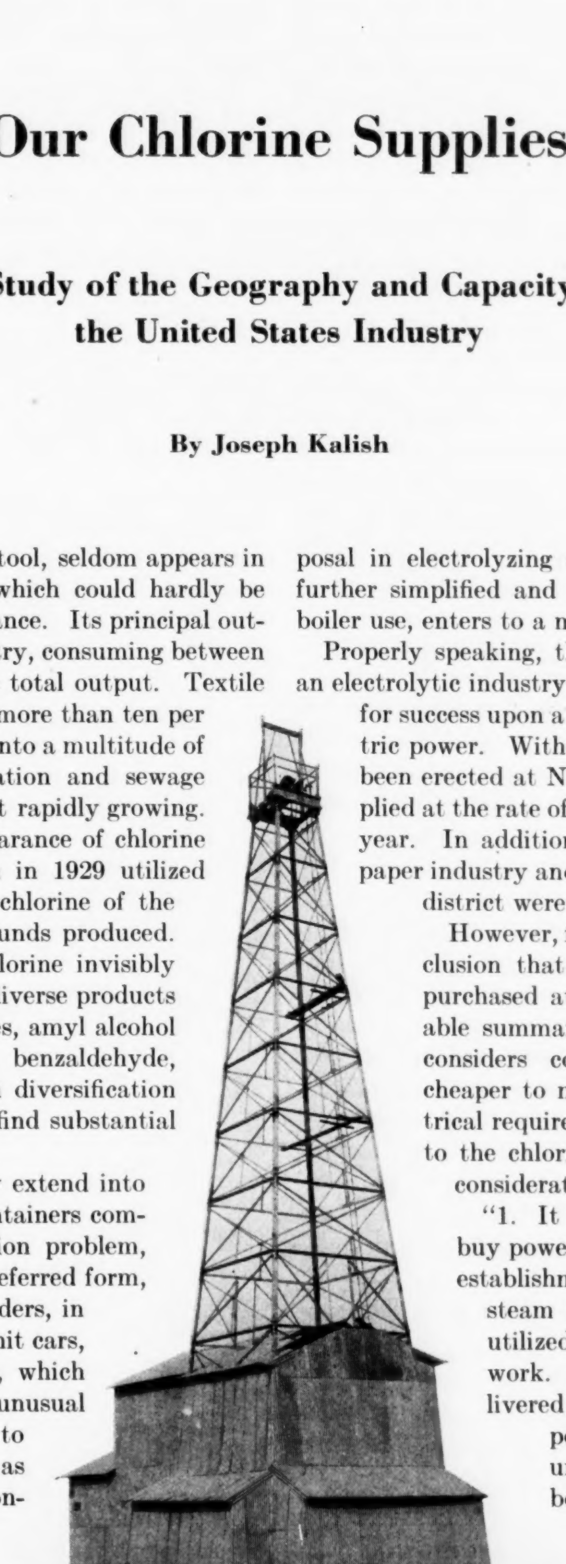
Our Chlorine Supplies

A Study of the Geography and Capacity of the United States Industry

By Joseph Kalish

CHLORINE, the chemical tool, seldom appears in the finished products which could hardly be made without its assistance. Its principal outlet is the pulp and paper industry, consuming between fifty and sixty per cent of the total output. Textile industries, account for hardly more than ten per cent while the remainder goes into a multitude of uses, of which water purification and sewage treatment are two of the most rapidly growing. An exception to the non-appearance of chlorine is carbon tetrachloride which in 1929 utilized almost 45,000,000 pounds of chlorine of the total of about 235,000,000 pounds produced. Aside from this, however, chlorine invisibly assists in the manufacture of diverse products like bromine, glycol derivatives, amyl alcohol and acetate, phenol, aniline, benzaldehyde, benzoic acid, etc. With such diversification chlorine may always hope to find substantial market.

Moreover, this market may extend into distant regions, as modern containers completely solve the transportation problem, for liquid chlorine, now the preferred form, is shipped in small steel cylinders, in one ton containers, in multi-unit cars, and in fifteen ton tank cars, which need be handled with no unusual caution. Thus, proximity to markets, although desirable, as always, is not the major consideration in locating the chlorine plant. Nor is labor a pressing problem, as ordinarily intelligent, semi-skilled workmen may be used and their wages need not be a larger element of production cost. As there is no waste disposal in electrolyzing salt, the location problem is further simplified and water supply, other than for boiler use, enters to a minor extent.



Abundance of brine has permitted tremendous growth of the chlorine industry in this country

Properly speaking, the manufacture of chlorine is an electrolytic industry and depends to a large extent for success upon a sufficient supply of cheap electric power. With this in mind, five plants have been erected at Niagara Falls, power being supplied at the rate of twenty dollars per horsepower year. In addition, proximity to the Canadian paper industry and a highly developed industrial district were considered favorable.

However, faulty logic enters into the conclusion that the cheapest power may be purchased at the lowest rate. An admirable summary in "Factory" (May, 1926) considers conditions where it may be cheaper to manufacture than to buy electrical requirements. Of special application to the chlorine industry are the following considerations:

"1. It pays to generate and not to buy power, in the smallest to the largest establishments, when all of the exhaust steam from the power units can be utilized for heating or for process work. Exhaust steam can now be delivered at high pressures (100 to 300 pounds and higher) from power units served by high-pressure boilers . . . Even a little factory with a 100 kilowatt engine generator set, using all its exhaust steam, may generate a kilowatt-hour for one-half pound of coal above the quantity that would be used for the heating alone with the engine shut down. This one-half

pound compares to the 2.05 pound per kilowatt-hour required by the average central station.

"2. It is usually cheaper to make than to buy power when the steam heating or process load which could be supplied by exhaust steam is relatively large in comparison to the power load. Thus if one-half of the engine or turbine exhaust be utilized to replace direct steam from the boilers, the fuel cost of power is almost halved. This applies to plants of all sizes . . ."

Thus coal is a major requirement in the manufacture of caustic soda and chlorine from sodium chloride. Here the requirements of caustic production enter, and these include steam for concentration of the liquor and heat to fuse the caustic and drive off the last traces of water. In addition are the usual power requirements for compression machinery, etc. Therefore, the Niagara location, with the cheapest purchase of electric power, must be scrutinized with respect to the cost of coal. Fuel at that location is not inordinately expensive, but consumers are necessarily paying freight which brings cost above more favorably located manufacturers.

Ranked with the cost of coal is the cost of the raw material, salt. Obviously, the manufacturer who purchases salt is at a disadvantage with one who possesses his own supply. Pumping out of the ground a natural or even an artificial saturated brine, requiring only little purification before use in an electrolytic cell, has many elements of cost in its favor when compared with buying solid salt carrying freight and profit.

With but three major items to be balanced, the problem of locating a chlorine plant is not particularly hard to solve. Cheap electricity can be important only where boiler capacity to operate generators in addition to the normal evaporation and non-electrical power requirements of the factory will be unnecessarily costly to install and operate. As a general rule, this will not be the case and the advantages of low priced electricity, without other favorable factors, may be wholly visionary.

Four Angles to Consider

Cheapest coal is supplied at the mine mouth but all coal mining regions are not equally advantageous, since a vital factor is the cost of salt. Again, location over a brine well will not assure success if power costs are exorbitant. Finally, all else being equal, the best site is within best range of the largest consumers.

From these considerations the chlorine industry in Michigan and West Virginia appears to be in the most advantageous situation. In the former state, abundant brine wells produce salt at an extremely low cost, local coal mines deliver coal cheaply, and plants are near important pulp and paper manufacturing regions. West Virginia produces coal cheaply and although at present only a portion of the raw material requirements are satisfied by underground brine, the rest being purchased, this may be corrected by systematic prospecting. Moreover, these plants are in the midst of a rapidly developing industrial district likely to consume growing quantities of electrolytic salt products.

Niagara Falls still leads in the number of chlorine plants, but it is worthy of note that the five located there now have a combined productive capacity of not more than 25 per cent of the total and no new plants have been built within recent years. On the Pacific Coast, when supply was less than the regional demand, early chlorine plants were protected from eastern competition by economic inaccessibility and could afford to disregard location considerations of extreme importance elsewhere; but now excess chlorine must be shipped out of the region to compete with more favorably situated producers.

Chlorine Producers Diversify

Following the example of several of the larger companies in the chemical field, chlorine producers have in many instances expanded vertically and, as will be seen in the following list, themselves manufacture producers' and consumers' goods in which chlorine is essential. Diversification by this means offers greater stability and enhanced profit margins. Questions of whether the company can maintain research sufficient for the improvement of many instead of a few products; whether the sales force can pry its way into competitive markets; whether finances permit carrying a product through its inevitable first unprofitable period, must all be examined individually by the management.

Belle Alkali Co., Belle, W. Va. The plant operates 320 Allen-Moore cells and 160 Vorce cells, with a combined productive capacity of 20 tons of caustic soda and 18 tons of chlorine daily. Steam turbines generate the necessary power at the plant and salt is in part purchased and in part pumped from a well owned by the company. Products made for sale are liquid chlorine, bleaching powder and caustic soda.

Diamond Alkali Co., Painesville, Ohio. Soda ash, made in a Solvay process plant with a capacity of 1800 tons daily is the major product of the company. Equipment includes a causticizing plant able to handle 300 tons daily, lime kilns of 350 tons limestone capacity, carbonating towers for 175 tons, distillers for 350 to 400 tons daily, calcining furnaces with a capacity of 110 tons daily, and granular soda dryers with a daily output of 275 tons. In addition, the cement plant, utilizing lime waste, can turn out 4,000 barrels of cement daily. Electrolytic equipment consists of Vorce cells with a rated capacity of 18 tons of chlorine daily. The company operates its own brine wells and manufactures electrical power. Products are chlorine and various soda products.

Dow Chemical Co., Midland, Mich. The plant uses cells developed by Dow and his colleagues and the

installed capacity is rated at about 100 tons of chlorine daily. Power is manufactured and the company owns brine wells which supply more than salt. In fact, the company was founded to recover bromine from the Michigan salt wells in the Midland region. These consist of a saturated solution of magnesium, calcium and sodium chlorides containing about 0.2 per cent bromine. After the latter has been liberated electrically and recovered, spent brine is worked for all its constituents. Sodium chloride is sold and is electrolyzed, magnesium hydroxide is processed to the sulfate, while magnesium chloride is the starting point for metallic magnesium and chlorine. Action of chlorine on carbon disulfide, manufactured at Midland, results in carbon tetrachloride (sometime raw material for chloroform,) sulfur chloride and sulfur. Chlorine also serves to oxidize arsenious oxide to arsenic acid for insecticide production. By-product hydrogen and chlorine combine to hydrochloric acid, said to have completely displaced sulfuric acid in the Dow plant. In addition, chlorine and benzene produce monochlorbenzene, raw material for Dow aniline and phenol processes, and enters into the halogenated indigos, all specialties of the company.

Production Capacities Summarized

E. I. du Pont de Nemours & Co., Inc., Deepwater Point, N. J. Modified Wheeler cells operating as an adjunct to the dye works have a capacity of nine tons of chlorine daily. Salt is purchased and electricity is generated. Du Pont rayon manufacturing requires enormous quantities of caustic, far beyond the capacity of this small installation.

Great Western Electrochemical Co., Pittsburg, Calif. Twenty-five tons of caustic soda may be produced at the Great Western plant through causticizing natural sodium carbonate, while electrical equipment employs Allen-Moore cells for a daily capacity of 40 tons of sodium hydroxide and 36 tons of chlorine. Hydro-electric power and salt are both purchased from nearby producers. Hydrochloric acid, ammonia, sulfur dioxide, various xanthates, ferric and zinc chlorides and diammonium phosphate appear in the company's product list. Use of oil from a neighboring refinery as fuel is noteworthy.

Hooker Electrochemical Co., Niagara Falls, N. Y. and Tacoma, Wash. Both plants make use of modified Townsend-Marsh cells. At Niagara Falls daily chlorine capacity is 72 tons of chlorine, while at Tacoma it is 27 tons. At both locations power and salt are purchased. Evidences of vertical growth appear in the list of products which, along with chlorine, caustic, and hydrochloric acid, include antimony chloride, benzoic acid and sodium benzoate, benzoyl chloride, benzyl alcohol, ferric chloride, chlorbenzenes, sulfur chlorides and sulfuryl chloride.

Isco Chemical Co., Niagara Falls, N. Y. Subsidiary of Innis-Speiden, produces primarily for the parent company's needs, utilizing Nelson cells with a daily productive capacity of 13.5 tons of chlorine. Power and salt are purchased.

Mathieson Alkali Works, Niagara Falls, N. Y., and Providence, R. I. At Saltville, Va., the company is a large producer of ammonia-soda soda ash, but is reported to be considering the building of an electroyltic chlorine plant in this good location. At Niagara Falls Castner mercury cells can produce 45 tons of chlorine daily, while at Providence, Nelson cells have a daily installed capacity of 13.5 tons of chlorine. Power and salt are purchased for both chlorine plants.

Monsanto Chemical Works, E. St. Louis, Ill. Chlorine manufacture is subordinate and complementary to the company's primary business of fine chemical manufacture. Power is generated and salt purchased for batteries of Allen-Moore cells with a daily chlorine capacity of 13.5 tons.

Niagara Alkali Co., Niagara Falls, N. Y. Vorce cells are able to produce 36 tons of chlorine daily from purchased salt and power. Products made for sale include caustic soda and potash, bleaching powder, hydrochloric acid and chlorbenzenes.

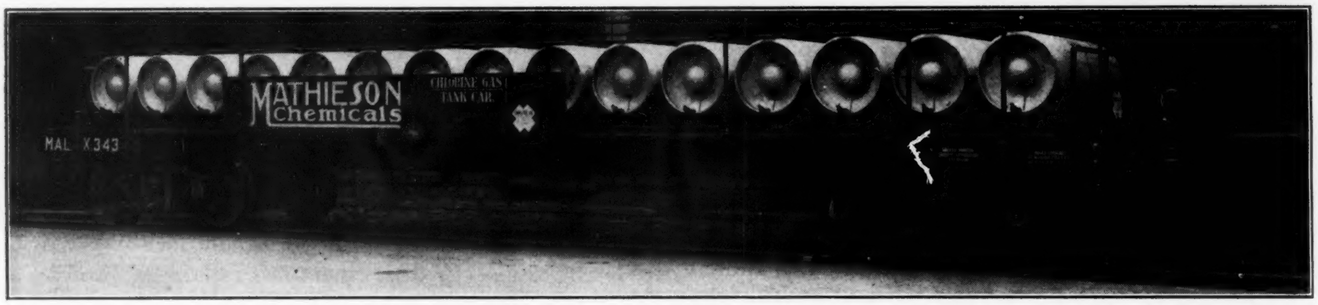
Pennsylvania Salt Manufacturing Co., Wyandotte, and Menominee, Mich. and Tacoma, Wash. All the plants use chlorine cells developed by Vorce. The capacity at Menominee is small, at Tacoma it is nine tons of chlorine daily, and at Wyandotte it is 115 tons of chlorine. At Tacoma power and salt are bought, while at the other locations, the company generates power and owns brine wells. Pennsylvania Salt sells a general line of heavy chemicals.

Solvay Process Co., Syracuse, N. Y. Probably the largest producer of soda ash in the world, the company concentrates its electrolytic chlorine operations at Syracuse, using Allen K. M. L. cells with a daily capacity of 36 tons of chlorine. Salt and electric power are produced in the plant. The usual Solvay process products are sold, with the addition of sodium nitrate, dichlorbenzene, caustic potash and chlorine.

Westvaco Chlorine Products Corp., S. Charleston, W. Va. Westvaco, using Vorce and Nelson cells, has a daily capacity of 145 tons of chlorine, about 35 per cent of which is normally pumped directly to the neighboring plant of the Carbide and Carbon Chemicals Corp. for the manufacture of the various solvents originating from ethylene and propylene. Power and salt are both purchased and produced, depending upon plant requirements.

Small Additional Tonnage

Additional chlorine installations are maintained by non-chemical manufacturers to assure a constant supply of material. These include paper manufacturers, an oil company making anhydrous aluminum chloride, and a detinning company.



Our Chlorine Deliveries

Developments Permitting Commercial Use of Liquid Chlorine Surveyed*

By W. L. Savell[1]

ESSENTIALLY, the problems to be solved in the economic distribution of chlorine are five—production, purification, liquefaction, packaging and transportation.

Since the introduction of the electrolytic cell, there has been improvement in efficiencies but no major change in the general method of producing chlorine. Much the same may be said with regard to the purification of the cell gas. In the compression and refrigeration used for liquefying the gas, there has been one major improvement. This is the use of sulfuric acid entrainment for compression as against the original use of mechanical compressors. With the exception of this last named development, the actual preparation of liquid chlorine was a comparatively simple technical problem.

It may be said that the major difficulties to be overcome in obtaining satisfactory distribution of liquid chlorine as an industrial or sanitary chemical were those of packaging and transportation.

The physical properties of chlorine are very favorable to successful and relatively easy packaging. The gas is heavy, being two and one-half times as heavy as air at 0° C. Liquid chlorine also has a high specific gravity, being roughly one and one-half times as heavy as water at 0° C. and even at a temperature of 60° C. the specific gravity is one and one-quarter times that of water. The gas liquefies under three and two-thirds atmospheres at this temperature and when cooled to approximately 33° C., it liquefies at atmospheric pressures.

The critical temperature is relatively high being approximately 145° C. and the critical pressure is relatively low, being approximately 84 atmospheres. These constants will be recognized as being practically ideal for the purpose.

*Abstract of address before Compressed Gas Mfrs. Association
[1]Technical advisor, Mathieson Alkali Works

The chemical properties on the other hand, are not so favorable. Because of its remarkable activity and its high oxidizing power, especially in the presence of moisture or at elevated temperatures, certain important problems are presented in packaging and transportation. While chlorine is not toxic in the true sense of the word, the odor which is disagreeable to most people, and the irritating effect which this gas has upon lung tissue, makes it essential even beyond economic considerations that packages and containers be practically perfect. This necessity is heightened by the fact that there is still some residue of fear inculcated in the minds of many by the use of chlorine as the first so-called poison gas in the World War.

That these problems have been satisfactorily solved is a great tribute to the individuals responsible for the development of the chlorine industry and to their joint efforts as members of The Chlorine Institute and the Compressed Gas Manufacturers' Association as well as the active co-operation of the Bureau of Explosives.

Out of this coordination of effort has been evolved standard practices mutually beneficial to the industry and to the consumer. Three general packages have been established—cylinders carrying 100 pounds and 150 pounds, ton containers as units on multi-unit tank cars, and single unit tank cars carrying fifteen and thirty tons minimum net weight of chlorine respectively.

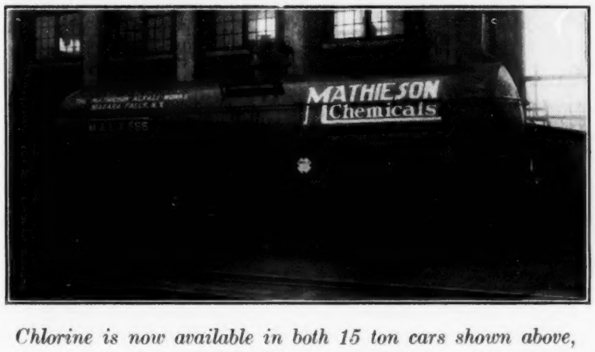
In the early days, the industry experimented with many types of containers including a single shipper. It was natural to attempt to avoid the handling of containers that must be returned. The single shipper however, proved to be entirely unsuitable for the purpose. Cylinders of welded construction were also tried. In some instances at least, these consisted of tubes with welded bottoms. Some difficulty developed

in weld failures. The standard chlorine cylinder today is of one-piece construction, drawn from a billet in the same manner that explosive shells are drawn and shouldered. These cylinders are equipped with a separate shoulder at the top, threaded to take a heavy wrought iron cap used for valve protection in shipment.

Adoption of a Standard Valve

The final standardization of the cylinder has come within the past two years with the general adoption of the Chlorine Institute valve. Up to this time several different valves were in use. One was actuated by a knurled head operating a differential screw movement. The other was a simple, sturdy valve stem threaded into the valve body with large square threads. This latter construction permitted the repacking of the valve while the cylinder was under pressure. The connections for discharge differed in these two types of valves, the first making use of a threaded boss made to receive a coupling nut. The second valve was made from hexagonal brass bar and was recessed at the outlet to receive a connector held in place by a valve clamp. Recognizing the virtues of the simpler valve for use with chlorine, the Institute modified it by adding a threaded boss so that it could be used with the coupling connector if desired and recessed the boss to receive the special clamp connector wherever this might be desirable.

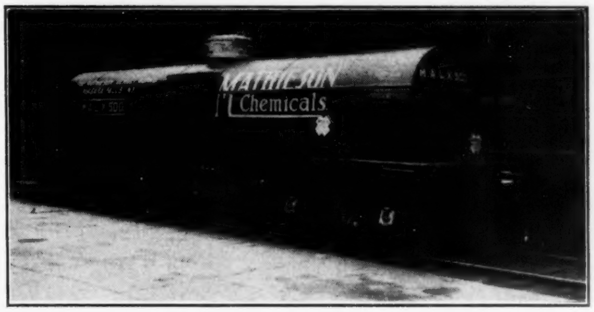
In order to insure a desirable safety factor, a routine of cylinder tests has been established. This calls for a periodic testing at pressures of 1,000 pounds per square inch for both the 100 pound and the 150 pound cylinders. Early experience has demonstrated the desirability of inspecting every cylinder upon its return to the owner. For this purpose, the valve is removed and completely disassembled, each part being critically inspected and discarded upon any show of defect or wear. A light is inserted into the cylinder and if any loose scale or other residue is noticeable, the cylinder is thoroughly cleaned and dried before being again placed in service. This practice is modified in the handling of cylinders transporting chlorine used in water purification. The cylinders in this service are cleaned after each trip. The reason for this extra precaution is that although the purity of the cylinder contents is regularly above 99.8%, there is a very small content, amounting to as much as two grams per 100 pounds, of a gummy material which upon accumulation, tends to interfere with the satisfactory operation of chlorinating equipment. This gummy material has been identified as hexachlorethane and is probably formed by the action of the chlorine upon the cell electrodes. As most chlorinating equipment makes use of small orifices, an amount of impurity insignificant in other uses becomes important in this application.



Chlorine is now available in both 15 ton cars shown above, and right, in 30 ton tank cars

Standards used in filling cylinders as well as other chlorine containers are based on the volumes of water which the container will hold. The weight of chlorine allowable is 1.25 times the weight of the water volume. This insures an adequate gas space above the liquid chlorine for expansion resulting from even excessive increases in temperature, and eliminating the possibility of hydrostatic rupture.

The ton container is one of fifteen units handled on a special underbody known as the multi-unit car and received by the carriers as a tank car. The same standard of filling applies to these containers as it does to the smaller ones. This unit is of forged welded construction 80″ long, 30″ in diameter and fitted with concave heads. The body is swedged in at the ends to form a chime and to give added strength to the heads. This construction also assists materially in handling these containers with hooks. The body of the container is made of three-eighths inch plate and the heads are made of three-quarter inch plate. Every two years these packages are tested under a hydrostatic pressure of 500 pounds per square inch. They are equipped with three safety plugs and two valves connected to eductor tubes on the inside, permitting the user to withdraw the chlorine as gas or liquid, according to his desire.



The single unit tank car, commonly called the Class V car, carries a forged welded tank permanently mounted and insulated with four inches of cork. Four valves located in a shielded dome provide facilities for drawing off the chlorine as liquid or gas. Two of these valves are connected to pipes running to a sump in the center of the car. At the bottom of these pipes special ball checks are installed which stop the flow of chlorine if the liquid feeds at a rate above 5,000 pounds per hour. The two other valves are connected directly into the top of the car to permit the gas to be withdrawn. Within this dome is also provided a

safety valve which prevents the pressure from ever reaching a point which would cause the tank to burst. Although a number of instances are on record wherein these single unit cars have been in the proximity of serious fires, there is no instance recorded in which the temperature of the car has increased sufficiently to require the service of this safety valve.

In common with all other shipping units, tank cars are weighed at the time of filling and reweighed on a second scale by another checker before shipping. This precaution is taken as an insurance against overloading.

Method used in emptying each container individually by means of pipe lines connected to a header on the car side

Beginning with the shipment of a single cylinder on April 23, 1909, followed by a tank car later in the same year, the industry has grown to a point where it requires seven hundred single unit or Class V cars, hundreds of multi-unit cars and hundreds of thousands of cylinders. The pulp, paper, chemical and textile industries and the sanitary uses account for more than 75% of the total chlorine consumption. The balance is distributed in various proportions to a wide range of uses including food production, metallurgy, lumber, drugs and innumerable others.

The industry has reason for considerable pride in the fact that there has not been a single transportation accident during its entire history resulting in a fatality. This, in spite of several train wrecks which involved chlorine tank cars.

At the consumer's end the record is also unimpeachable. This may be attributed to the conscientious efforts of the chlorine producers to educate the customer in detail regarding the proper equipment and technique for handling this material safely and economically.

New uses for chlorine are constantly under development. With each new use special problems of application and handling will undoubtedly arise. That these problems will be met and solved successfully as they arise cannot be doubted in view of the obstacles that have already been surmounted.

Chemicals In Road Building

Chemistry has been an important factor in the growth and development of the present-day highway points out a report of the Chemical Division of the Dept. of Commerce. Explosives clear the way for road routes, and provide raw road materials; coal-tar products supply paving surfaces; other chemicals enter into road treatment as well as in the test of construction materials.

Use of Explosives for Road Building World-Wide

According to the U. S. Bureau of Mines, production of explosives in the U. S. in 1930 amounted to 445,090,500 pounds, of which 72,661,000 were used for "quarrying and nonmetallic mineral mining" and 85,795,800 for "railway and other construction work." Unofficial estimates place consumption of dynamite in highway work at about 30,000,000 pounds annually, and considerable quantities of blasting powder also are used.

The United States, besides supplying most of its own demand, exports explosives to other parts of the world. In 1930 explosives, caps, and fuses were shipped to the value of $2,950,400, going chiefly to other American countries and to the Far East. Increasing exports to Latin-American countries during recent years are reflected in their highway and mining progress. Important consumers of explosives are Canada, Cuba, Mexico, Chile, Peru, Panama, Honduras, Colombia, Ecuador, Venezuela, Java, China, and the Philippine Islands.

Coal Tar First of Modern Surface Materials

Coal tar is the earliest of all modern road-surfacing materials and ranks with explosives as chemistry's chief contribution to highway progress. Coal tar conforming with certain specifications is being employed extensively as a road dressing, competing actively with petroleum and natural asphalt. Although no data showing the amounts thus used are available, it is known that considerable quantities are consumed for surfacing, binding, preserving, and dust settling, imparting to hard wearing surfaces a good grip for motor traffic. Among its other uses may be mentioned its applications as a waterproofing coat to concrete piers, and for protecting concrete placed in contact with alkaline water.

Coal tar and coal-tar products for road surfacing and maintenance are used widely both at home and abroad. Although much of the demand frequently is supplied from domestic sources, these commodities also figure in international trade. U. S. exports of crude coal tar and coal-tar pitch were valued at $563,500 in 1930 and went to 42 different world markets.

Calcium chloride is produced in the United States to an amount of about 200,000 tons annually. Exports of calcium chloride in 1930 amounted to 42,700,000 pounds, worth $513,600, most of which went to Canada. Panama, Cuba, Newfoundland and Labrador, Colombia, Argentine, and Mexico are other leading markets among the 51 countries that imported calcium chloride from the United States. That a large proportion of this trade is going into the construction of highways is shown by official Canadian imports for the fiscal year ended March 31, 1931, of "calcium chloride not in solution, for road-treating purposes only," amounting to 38,682,600 pounds. More than 34,000,000 pounds came from the United States, a marked increase over imports of preceding fiscal years.

Silicate of Soda in Favor Abroad

Silicate of soda resembles calcium chloride in many of its applications to highways, and finds favor in foreign countries for curing, hardening, and water-proofing concrete roads; for binding macadam roads; and as a dust palliative. The American output of sodium silicate approximates half a million tons, and, like calcium chloride, figures prominently in chemical exports. Its consumption, however, for road work is only one of several major uses. During 1930 shipments of sodium silicate amounting to 60,494,300 pounds, worth $571,700, went to 46 world markets, but Canada again absorbed almost the entire amount, followed by Mexico, Cuba, and Japan.

Plant Management

A Department

Devoted to the Business Problems of Chemical-Process Production

Lower Transportation Costs

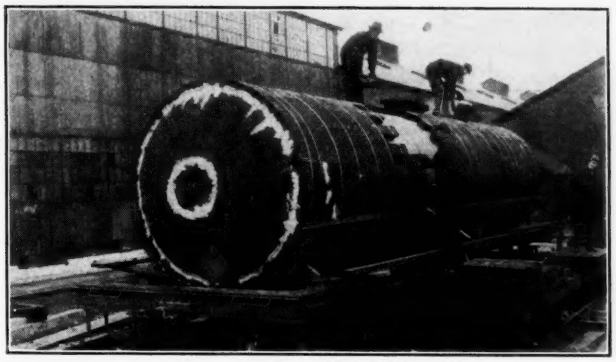
A superintendent of a medium sized steel tube plant is blessing the depression because of the new installation of acid handling equipment. In 1928 and again in 1929 he had recommended the erection of storage tanks so that acid might be purchased in tank cars. So busy was the mill attempting to keep up the pace of production with sales that nothing dared be done. In addition the "front office" felt that the initial cost of installation was entirely too high. Another somewhat similar case is that of a fairly large user of liquid chlorine, except that the final decision to go to tank car delivery is temporarily being held up by complications over local municipal ordinances.

Manufacturing costs will go down in the next five years, but greater paring down must be done in the cost of distribution. Here is a point of contact where enlightened plant management can cooperate.

A great deal of time was given over at the recent Compressed Gas Manufacturers' Association meeting to a discussion of ways and means of economic transportation of several important industrial chemicals. Careful reading of L. A. Belding's address, printed in the following pages, shows how much has already been accomplished by intelligent cooperation between maker and user with the equipment manufacturer acting as the intermediary. Of still greater importance is the glimpse he gives of what developments may confidently be expected in the next few years. Several important dry powdery materials, for example, admirably lend themselves to movement by tank cars. One after the other troublesome and costly transportation problems will be attacked but in every instance the seller of the car or other equipment will need active cooperation from plant operating officials. Not only is open-mindedness required, but considerable initiative. Whether raw products are purchased on an f. o. b. or a delivered basis the transportation charges are paid by the buyer. Sometimes plant men temporarily lose sight of this fact. With freight rates likely to go higher, economical shipping and cheaper handling devices will become increasingly important. It might well prove to be very profitable for plant managers to go over their plant layout now when production is not crowding out every other consideration. The number of plants that could profitably adopt tank car deliveries of acids, caustic soda, chlorine, ammonia, and many other industrial chemicals, but have not as yet done so, is surprisingly large. With equipment at lower prices, with plant help in many instances not particularly busy and available for much of the labor required, and with such labor as is necessary available at reduced wage scales, many changes figured on an entirely new basis will at once show up in a more favorable light and prove to be far more attractive than they did three years ago.

Tank Cars Show the Way to New Industrial Economics*

By L. A. Belding[1]



Constructing a high-pressure tank car suitable for the transportation of propane and similar products at the shops of the General American Tank Car Corporation

TANK cars are looked upon as the most versatile of all vehicles of transportation and have now attained a place in industry which extends far beyond the boundary of the petroleum field and includes the transportation of nearly every type and variety of industrial liquid, compressed gas, and granular materials. As our modern chemical research is constantly creating new commodities, tank cars of special construction are similarly created to carry these new creations to new markets reaching the far corners of our industrial map.

Why is it that the composite picture consisting of extensive unemployment, total drop in national income of some four billions of dollars, and unusual slackness in general business, makes a very splendid market for special tank cars ? The answer is that these special tank cars are pointing the way to new industrial economies and their very usefulness creates the demand.

Trade commands strange errands. But trade today is absolutely dependent on tank cars. The tank car has developed with trade conditions and has pointed the way to new economies and new markets, and without such cars sites of factories would have to be moved, and our whole industrial map would be very appreciably changed.

The car builder has exhibited a readiness to go beyond the usual in order to meet the needs of the rapidly changing industrial world, and the cars now on the rails, of very recent creation, eloquently speak approval of the car builders' efforts.

The liquefied Petroleum Gas business which marketed some twenty-seven million gallons of propane and butane in 1931, could not exist without tank cars; liquefied chlorine selling under three cents a pound is finding a tough competitor for some bleaching operations, in concentrated hydrogen peroxide, selling at approximately twenty cents a pound and carried in special aluminum alloy tank cars; anhydrous ammonia looked upon as our new alkali, is carried to market in anhydrous state, in 25-ton packages; caustic soda in a 50 per cent water solution delivered in tank cars, sells to consumer for less per ton than solid caustic soda and the rayon industry is now getting iron-free liquid caustic soda in newly created nickel-lined tank cars. When and if the demands of industry for transporting liquids comes to an end, and when and if the imagination of the car builder becomes exhausted in applications of cars to liquid transports, he can then turn to transporting solid materials and granular materials, such as wheat flour, quick lime, Portland cement, and pulverized coal, which are pumped in and out of special tank cars in a manner similar to liquids, and enjoy all the economies of tank car transportation.

True it is that new types of tank cars are disrupters of old-established industries, but at the same time creators of new boundaries for new products of new

*Address delivered before the Compressed Gas Mfrs. Association, Jan. 25.
[1] General American Tank Car Corp.

industries. Let us specifically examine into some of these newer cars.

Despite the present depression, the liquefied hydrocarbon gas industry has achieved during the past few months a record of development that compares favorably with that of electric refrigeration or radios in more prosperous times. All the convenience of the city dweller is carried almost to the very kitchen of the home in the small town, farm, or outlying district, by means of tank cars. Bankrupt manufacturing gas plants have an opportunity of becoming solvent. Distribution of manufactured gas in small communities, commanding high fixed charges and high operating costs cannot show profits on the small gas consumption of these smaller towns, but propane or butane can be applied with very small initial investment, and unbelievably small operating costs, and delivered to the community as a clean, uniform, nonpoisonous gas admirably adapted to domestic heating problems. These liquefied petroleum gases, heavier than permanent gases but lighter than the liquid fractions which are too volatile to be blended in large proportions with motor fuels, can be economically shipped to industries and for local distribution to homes in special tank cars as a liquid; but not until the car builder created special cars could these propanes and butanes be economically transported and distributed in volume, so that it can truly be said that the car builder has made the liquefied petroleum gas industry possible.

The quantities of these gases marketed speak well of the tank car's contribution, when it is realized that the first of these high-pressure cars for the transportation of propane, was built in 1925:

	Consumption Figures for Six Years	
1926	465,068	gal.
1927	1,091,005	"
1928	4,522,899	"
1929	9,925,698	"
1930	18,017,347	"
1931	27,000,000	" (estimated)

The growth of the synthetic acetic acid industry can be in a large measure directly traced to the ability of the tank car manufacturer to provide means of moving concentrated acid safely and without slightest contamination.

Little was it realized when that first special high-pressure car for transporting propane was built in 1925, that it would point the way to economies that would permit the development of a market of some 1,300,000 customers, which latter "should be regarded as sound prospects for propane and butane developments independent of city gas systems." Thus, this special car created primarily to transport propanes to chemical processes, has shown such economies as to make it possible to establish an entirely new industry.

Chlorine in tank car lots is now an old story, and the history of chlorine shipments free from all major accidents since its inception, is an enviable one. Developments that resulted in the successful design and construction of chlorine cars, lead into new uses for the same type of car.

Sulfur dioxide, used largely as a refrigerant, in small domestic refrigerators, must be dry and pure to be successfully used, and until recently it was thought that sulfur dioxide had to move in small containers to insure its purity and dryness. The car builder applied heater coils to the outside of an insulated forge-welded tank carrying 60,000 pounds and made it possible to heat and dry the interior of the tank before the dry sulfur dioxide was poured into it.

The very same type of car, used for propane, anhydrous ammonia, chlorine and sulfur dioxide, was available and ready when it came to the transportation of the costly, special tetraethyl lead fluid used to make our anti-knock gasoline. Cars for ethyl fluid are very new in their application, but previous engineering and developments had made them ready when the demand for bulk shipments of this fluid came.

Use of Aluminum in Tank Cars

It was only two years ago that engineers and car builders still doubted the practicability of building tank cars of aluminum. Today aluminum tank cars are successfully transporting glacial acetic acid, acetic anhydride, glycerine, formaldehyde, and concentrated hydrogen peroxide to a variety of industries. Here is a splendid example of a case where industry demanded a new type of container for commercial transportation, which was developed by the car builder, and as soon as the new type of car came into being it immediately pointed the way to new economies and new markets, and has definitely broadened and extended the boundaries of these markets, so that the economies accomplished are reflected to everyone of us in purchases of our daily needs. The very development of this aluminum car put out of business many small hard-wood distillation plants throughout the country that had been producing calcium acetate in small tonnages. Acetic acid made synthetically has transportation facilities in the aluminum tank car comparable to its low manufacturing costs. In fact

these new synthetic acetic acid plants could not produce and sell at prices now in vogue except for the aluminum tank car.

Prior to the aluminum tank car, aluminum barrels were used, but freight had to be paid on the aluminum barrel as well as the acetic acid therein and the barrels had to be handled in box cars, involving a large labor item both for loading and unloading, and it was no easy matter to thaw the acetic acid and empty the aluminum barrels. With the advent of the aluminum tank car, equipped with seamless aluminum heater coils, barrel shipments diminished almost to the vanishing point.

The problems of building a tank car of aluminum plates were many, and in fact it was stated in no uncertain terms when the proposition was first put forward, that it would not be possible to build a car of aluminum alloys that would carry 8,000 gallons of glacial acetic acid because the excessive vibration that a railroad car gets would soon crystallize the aluminum and crack it; or because aluminum being a soft metal it would "cold-flow" and the riveted joints would leak. However, an 8,000-gallon aluminum tank car was built by the General American Tank Car Corporation, in close co-operation with the Aluminum Company of America, and it was a complete success from its very inception.

Formaldehyde as produced is a clear colorless liquid, but when delivered to manufacturers of molding compounds in steel tank cars, it is received as a brown liquid. The iron rust causing this discoloration and which is picked up from the steel tank car, interferes seriously with the use of formaldehyde in the manufacture of plastics, photographic film, inks, and artificial leathers, and therefore, formaldehyde is now shipped in insulated aluminum tank cars and is received in the same clear water-white condition in which it is made.

Glycerine when used in medicinal products must not be contaminated with iron rust; until only a few months ago all such glycerine, of which large tonnages are moved, has had to be delivered in large glass bottles. It is now delivered to manufacturers of cold creams, cosmetics, and medicinal compounds in aluminum tank cars and maintains the same purity as when delivered in glass bottles. Such is the effect of the aluminum tank car on industry within the past two years, and we can expect the car to develop new fields of usefulness and to contribute its portion in changing our industrial map.

Introduction of Chrome Alloys

New chrome alloys made available through the splendid accomplishments of modern metallurgy, have made it possible to build new tank cars effecting very splendid economies in the transportation of corrosive acids. Commercial nitric acid is now regularly transported in tank cars made of stainless steel plates, gradually displacing carboy shipments which in the past have caused so much trouble to acid producers, as well as the railroads.

Through consideration of the latest developments of the car builder chemical manufacturers made new boundaries for business or new methods of meeting price competition so as to maintain and increase profits.

Just as these very special cars were created for a special purpose, they too have performed the dual function of filling the immediate need and pointing the way to new uses. A market has recently developed for water-white sulfuric acid of 66 degrees Baumé concentration. Such acid, up to the present, has regularly been shipped in carbon steel tank cars, which when kept dry causes no serious corrosion, but there is some iron pickup and some discoloration when using carbon steel tank cars. Tank cars made of stainless steel will not discolor this clean, water-white sulfuric acid.

From Test-tube to Tank Car

Just as the research chemist develops his process from test-tubes to commercial plant and attempts to carry into the commercial plant apparatus quite similar to the laboratory, so he dreams, and sometimes demands that tank cars used to transport the finished article to the consumer, be not far different in structural materials from that of the laboratory or the chemical manufacturing plant. Equipment in the chemical plant is very frequently copper-lined, lead-lined, rubber-lined, nickel-lined, or glass-coated, but it must not be forgotten that in general such equipment in a chemical plant is not subjected to the vibration and rough handling that is part of the life of a tank car. When tank cars are asked to be lined in a similar manner, the problem is a difficult one.

The continual vibration of a car lead-lined will cause the lead to flow; the surge of the lading in a copper-lined tank car will draw the copper away from the steel lining; glass-lined equipment when mounted on a railroad car is subjected to severe shocks; but notwithstanding all these difficulties, some very interesting cars have been developed and have been put into successful use.

Caustic soda can be more economically shipped in liquid form than in solid form, but when shipped as a

water solution in carbon steel tank cars it becomes contaminated with iron, and such iron contamination causes very serious troubles to the rayon industry. The Viscose Process for making rayon, by which 80 per cent of the world's rayon is produced, consists of dissolving cellulose in caustic soda, and the caustic soda used has to be of a very low iron content, otherwise the process will not operate successfully. It has been the general practice of companies making viscose rayon, to buy caustic soda in solid form so as to insure the low iron content, but this is expensive because the production of solid, or fused, caustic soda by the alkali manufacturers, costs more than the production of liquid caustic soda, and the rayon manufacturer has to take the solid caustic soda and put it into solution before he uses it; so the difference in cost of solid caustic soda over liquid caustic soda is approximately $8.00 per ton of sodium hydroxide. When it is considered that one rayon manufacturer alone consumes approximately 50,000 tons of caustic soda a year, this amounts to a premium of some $400,000.00, which the new nickel-lined tank car is destined to save yearly to this one consumer because the car will deliver liquid caustic soda without iron contamination.

Supplying Iron Free Caustic

The car is completely lined with nickel on the interior. The production of these nickel-clad steel plates to be used in the manufacture of this tank car is a tribute to modern metallurgy and to the engineering ability of the International Nickel Company and the very splendid co-operation of the Lukens Steel Company. A billet of nickel, properly prepared, is placed upon a billet of prepared steel and heated to proper rolling temperature and then this nickel which cannot fuse at the same temperature of steel and which has different mechanical properties, is rolled out and successfully bonded to the steel. These nickel-clad steel plates are formed to make the tank and are riveted with pure nickel rivets.

These new nickel-lined tank cars have now had sufficient service to prove that the engineering is correct and the economies can be counted, so that we are encouraged to build additional cars, and in fact, are proceeding with such fabrication at this time and expect again that this new tank car built for a definite purpose will not only entirely revolutionize and change the delivery of caustic soda to the manufacturers of rayons and soaps, but will point the way to new economies in the transportation of other products. In fact, this broadening of the use of the nickel-lined tank car for example is suggesting to candy manufacturers the economy of transporting hot chocolate coatings as liquid.

For commodities that require protection from the carbon steel tank but do not demand 100 per cent protection, a more economical tank car can be constructed by metal-spraying its interior with metals such as tin, aluminum, zinc, copper, etc. These coatings are somewhat porous but are entirely suitable for ladings such as corn syrups, sugar syrups, and the weaker organic acids.

Helium and Ethane

Helium for use in our lighter-than-air airships, has made necessary an entirely new type of car. The car builder with the helpful co-operation of the U. S. Navy has created a type of car that makes the transportation of helium economical, and this car effects such savings in the transportation of helium, over transporting the same amount of helium in small cylinders, as to pay for itself in fifteen trips. The earlier method of shipping in small cylinders permitted loading about 600 of these cylinders in a box car, and carrying a total of about 100,000 cubic feet of helium. This new car carries 225,000 cubic feet of helium at normal temperature and pressure. The twenty-eight tanks on the car are seamless-drawn of substantially the same physical and chemical characteristics as the smaller oxygen cylinders. Even with the capacity of this new car there will be required approximately thirty carloads to fill the U. S. S. "Akron." With a car of this type operating at 2,250 pounds per square inch, tested at 3,750 pounds per square inch, similar economies could be effected in the transportation of other gases such as oxygen and hydrogen.

The new high-pressure car developed for the transportation of helium, and effecting very marked economies, points the way to the day when our dirigibles will be using gaseous motor fuels instead of liquid fuels. This car is available for the transportation of ethane and ethane derivatives, which might constitute such fuels.

Dry Chemicals in Tank Cars ?

In just the way that it is possible to pump various liquids in and out of tank cars and save labor costs for handling, so we are beginning to pump granular materials such as wheat flour, Portland cement, lime, feldspar, etc. in and out of special tank cars. By aerating a material such as Portland cement it will flow almost as readily as a liquid, and is handled as such. Special cars with conveying equipment built therein, and with water-tight gasketed, loading and unloading hatches, are a far better way of shipping these granular materials than by loading them in bulk in a box car with a chance of leaky roofs, or loss of material through leaks in the car. Of course, the labor saving by pumping such granular materials in and out of tank cars over packaging such materials and placing them in box cars, is enormous, and amply justifies all the development work necessary for the car builder to produce such cars.

The new cars which we have described above, designed to take new products to new markets in the form and quantity units to please the customers, not only must comply with certain definite engineering limitations, but must be built within stringent specifications set forth by such regulatory bodies as the Interstate Commerce Commission and the American Railway Association.

The compressed gas manufacturer is concerned primarily with safe and economical transportation, but he is also interested in developing new products and new markets. Through consideration of the latest developments of the car builder he may find new boundaries for his business or new methods of meeting price competition so as to maintain and increase the profits of his company.

When Is It Economical To Use Liquid Caustic Soda?*

The prospective user of liquid caustic soda must first satisfy the requirement of having his plant located on a railroad siding. It is then easily determined whether or not it is economical to use liquid caustic soda by consideration of the equation:—

Saving *in purchase price*	+	Saving *in handling cost*	vs.	Capital Investment *for handling equipment*

Saving in Purchase Price

The saving to be realized by purchasing caustic soda in liquid form as against solid or flake depends upon the effective freight rate to consuming point, and a constant differential in price at works between the three physical forms.

Where a saving in purchase price is shown, it is obviously to the consumer's interest to investigate the equation further. If the total saving shows a satisfactory return on the capital investment necessary, liquid caustic soda should be used.

Saving in Handling Cost

Local conditions cause a variation in the actual amount saved in handling by the use of the liquid form. Your saving can be calculated by noting the cost of unloading cars, handling to and from storage and dissolving the annual requirement of either solid or flake caustic soda, less the estimated cost of handling an equivalent amount of liquor in tank car lots.

Capital investment for handling equipment also depends on local conditions. The essentials of an installation are simple and call for (1) a storage tank; (2) pipe lines for conveying liquor to and from storage; (3) a steam line at the car unloading point for winter unloading; (4) an easy means of transferring the liquor—either centrifugal pump or air-pressure. Part or all of this equipment may be already at hand, which would reduce any new expenditure necessary. After reviewing the discussions of equipment an estimate of the equipment required can be readily made.

Advantages In Use Of Liquid

Nearly all large consumers find liquid caustic soda more economical than solid or flake. Advantages of the liquid form may be summarized as follows:

1. Lower cost per 100 pounds of NaOH delivered at plant where freight rate is below approximately 37 cents per 100 pounds.
2. Lower cost of handling caustic soda at plant.
   The handling of liquid involves simply the transferring of the liquor via pipe line from tank car to storage tank and again by pipe line from there to operation.
   The handling of solid or flake involves the use of labor for unloading the car, transferring the drums to storage, bringing them out of storage to the point of dissolving, opening the drums and dissolving the caustic, and disposing of the empty drums.
3. Cleaner and more efficient operation.
4. A greater factor of safety in operating which is natural to the convenience and efficiency with which liquid caustic soda can be handled.

The essential equipment for handling liquid caustic soda in tank cars is (1) Storage tanks, (2) Pipe lines for liquor and for steam, (3) Pumps, air pressure or some other method of forcing the liquor from tank cars to storage and from storage to operation.

The choice and arrangement of this equipment depends largely upon the method used for unloading tank cars, which, in turn is dependent upon local conditions. Four practical unloading methods, are illustrated by simple straight-line sketches.

In the Gravity method the liquor flows to storage under the pressure of its own weight. This is the simplest and most economical means of unloading, but applicable only when the storage tank is below the level of the tank on the car. In the Pumping method the liquor is transferred to storage by means of a suitable pump, centrifugal type preferred. This method is applicable to most plant conditions and is generally the most satisfactory. In the Air Pressure method the liquor is forced to storage tanks by means of air pressure applied over the surface of the liquor in the car through an inlet provided in the dome. This method is economical, but used only where the lift is not too great and the installation of a pump not convenient.

In the Steam Syphon method the liquor is caused to flow to storage by blowing a small amount of steam continuously into the discharge line at X. This method works satisfactorily for small lifts only and, of course, slight dilution will take place due to condensation of the steam used. Having determined upon the most practical unloading method consistent with local conditions, the final choice of equipment is open to the following considerations:—

Storage Tanks

Size and number of storage tanks necessarily is dependent upon the annual consumption of caustic soda, the time in transit of shipments, and the reserve supply required. It is suggested that storage capacity be provided for at least two to three weeks' supply, and that in no case should a storage tank be less than 12,000 to 15,000 gallons capacity.

Storage tanks should be located inside a building wherever possible, and preferably at a point where the year round temperature is above 50° F. The best location is determined by its relationship to the point of consumption, available space and proximity to the siding where tank cars would be spotted. If tanks are located outside, they should be insulated to prevent difficulties in cold weather, but expensive insulation is not necessary or desirable. A two-inch layer of hairfelt, covered with weather paper, is quite satisfactory for this purpose and easily removed to make repairs.

The most satisfactory storage tanks for liquid caustic soda are usually the horizontal, cylindrical type, made of not less than 3/8" boiler plate steel of riveted and welded construction throughout. They should be provided with a man-hole opening on top, an inlet and two outlets. One outlet should be flush with the bottom of the tank, to be used for cleaning purposes, and the other should extend up into the tank three or four inches, to be used for regular supply. Frequently, tanks are already on hand which can be used for liquid caustic storage, but the purchase of second-hand tanks for this purpose is not generally recommended. All outside storage tanks should be provided with a heating coil consisting of at least 50 ft. of 2" pipe, as insurance against the

*Abstracted from recent booklet of the Columbia Alkali Co.

possibility of crystallization taking place in cold weather. This heating coil is best located near the outlet of the tank.

General Specifications for Pipe Lines

All pipe lines, both to and from storage, should be either two-inch or three-inch, and fabricated of wrought iron or double strength steel. Flanged joints are preferable, with which a good grade of rubber gasket should be used. For connecting the tank car to the discharge line, a length of flexible steel hose is recommended. For connecting steam or air lines to the car, rubber hose capable of standing high pressure is suggested. These flexible hose connections obviate the necessity of spotting cars at exact points, and are much easier to work with than permanent connections.

Pipe lines should run inside of buildings wherever possible, and should be so laid that complete drainage can be effected following use. Caustic liquor should never be allowed to remain in pipe lines. Also, such lines should be readily accessible at all times. Where lines are exposed to cold weather, it is preferable to insulate them, although this precaution is not absolutely necessary. It can be avoided if arrangements are made whereby the lines can be warmed by steaming prior to sending liquor through them. This will prevent any crystallization in the lines in cold weather. A good arrangement is to run the steam line and discharge line from tank car to storage side by side, wrapping both in the same insulation, in which case the steam line serves to keep the discharge line warm.

In event that air pressure is used for unloading tank cars, a ¾″ line is satisfactory. A safety valve and pressure gauge should be placed in this line at its entry into the tank car dome, and a pressure of twenty-five pounds should at no time be exceeded. This precaution is advisable, although there are safety valves on the car set at twenty-five pounds pressure.

For transferring liquid caustic, both from tank car to storage and from storage to process use, centrifugal pumps are recommended. They should be located inside a building, if possible, or otherwise protected from the cold weather. A two-inch pump will be found entirely satisfactory, and can often be arranged to handle both the unloading and distribution from storage. A centrifugal pump of good cast iron construction of both casing and impellor works very satisfactorily. There are several good makes on the market.

Asbestos packed (A.P.) cast iron plug cocks are recommended for use in the entire caustic liquor pipe system. Lubricated cocks, with special caustic lubricant now on the market, may be used to advantage, but at a higher initial cost.

Equipment Bulletins

Aluminum Co. of America, Oliver Bldg., Pittsburgh. A 65 page booklet giving complete details on Alcoa Aluminum and its alloys. Contains in addition a wealth of technical data and should be in the library of every chemical engineer.

Blaw-Knox Co., Pittsburg. Bulletin 1,326 describes the Blaw-Knox Turbine Mixer. An 11 page booklet replete with valuable information.

Combustion Engineering Corp., 200 Madison Ave., N. Y. City. An 8 page booklet on C-E VM Type Boiler together with pertinent engineering data.

Glascote Co., 20,900 St. Clair Ave., Cleveland. A 12 page booklet, illustrated, describing various models and sizes of the Glascote line of glass-lined storage and mixing tanks.

Linde Air Products Co., 30 E 42 St., N. Y. City Oxy-Acetylene Tips for January contains a splendid review of welding and cutting advances in 1931.

Schwenk Safety Device Corp., 27 Water st., N. Y. City. A new leaflet on Schwenk carboy tilters.

Surface Combustion Corp., Toledo. A 30 page booklet, profusely illustrated, describing individual services afforded to users of Surface Combustion heating equipment because of the extensive research facilities of the company.

The Industry's Bookshelf

The Law of Patents for Chemists, by Joseph Rossman, 304 p., published by The Inventors Publishing Co., Washington, D. C. $3.50.

A comprehensive discussion of chemical patents in non-technical language containing a wealth of information on the essential principles of patent law and procedure. Of particular value to those engaged in the executive and commercial divisions of the chemical industry.

Recent Advances in Analytical Chemistry, by C. Ainsworth Mitchell, 452 p., published by P. Blakiston, Phila. $3.50.

A valuable addition to the standard works on analytical chemistry giving new and better methods of handling special problems. Each subject is written by a specialist in that line.

Handbook of Chemistry and Physics, by Charles David Hodgman and Norbert Adolph Lange, 1,558 p., published by Chemical Rubber Pub. Co., Cleveland, O. $5.00.

A standard work of proven value which needs no introduction. Over 100 additional pages of material are included in the latest addition. Several revisions and minor changes have also been made.

Capitalism on Trial, by Julia Emily Johnsen, 210 p., published by H. W. Wilson, N. Y. 90c.

A discussion pro and con of the capital system and the two possible alternatives, socialism and communism.

A Textbook of Pharmacognosy, by J. W. Cooper and T. C. Denston, 298 p., published by Isaac Pitman & Sons, N. Y. $3.00.

A book designed specially for students preparing for druggist qualifying examinations. A detailed resume of drugs, their sources, collection, preparation, and constituents. Also well supplied with suitable laboratory material.

Manual of Industrial Chemistry, edited by Allen Rogers, 2 volumes, published by D. Van Nostrand Co., Inc., N. Y. $13.00.

Outstanding contribution to the literature dealing with chemical engineering. The new edition is thoroughly up-to-date in the descriptions of new methods, new processes, new ideas. A vital necessary tool in the "kit" of every one connected with production or consultation on chemical or allied industries' problem.

Industrial Hygiene, by Carey P. McCord, 336 p., published by Harper & Bros., N. Y. $5.00.

Plant managers, industrial engineers, industrial doctors and nurses, and everyone charged with the care of the health of workers in industry, will find here a working handbook on every phase of the preservation of human life in industry.

Foreign Trade in 1931; Official report of the Eighteenth National Foreign Trade Convention, National Foreign Trade Council. $2.50.

A verbatim report of the proceedings held May 27-29, 1931 at New York City including a foreign trade accounting of nine basic industries, made by leading executives in each industry in a series of "conventions within a convention."

The Kinetics of Homogeneous Gas Reactions, by Louis S. Kassel, 330 p., published by The Chemical Catalog Co., N. Y. $6.50.

An important addition to the series of American Chemical Society Monographs on a subject which at the moment has a very direct interest in several practical applications. A complete survey of the theory of reaction kinetics together with valuable experimental data.

Monetary Inflation in Chile, by Frank Whitson Fetter, 226 p., published by Princeton University Press, Princeton, N. J. $2.50.

One of the most often suggested cure-alls for present conditions is that of forced inflation and abandonment of the gold standard. This work describes Chile's experience with paper money interpreted in the light of monetary principles.

Foreign News

Nitrogen Situation Becomes More Involved in Chile and France

Developments in the nitrogen situation continued to occupy first place in foreign and domestic news. In Chile a strike called on Jan. 11 to protest, among other things, the present Cosach set-up utterly failed to create any major uprising of the populace. In Washington the Senate Finance Committee delved into the possible relationship of the financial arrangements surrounding the formation of the Cosach and Chile's inability to pay on her foreign indebtedness (p.169). In France announcement was made of the official closing of a contract with German producers for purchase of from 100,000 to 150,000 tons of synthetic nitrate of soda at a price of 83 francs per metric quintal, c. i. f. French ports. Just what the position of the former suppliers of France, Chile, U. S., and Norway is to be is not at all plain at the moment. Undoubtedly Cosach will make desperate efforts to hold its former tonnage in France. M. G. B. Whelpley, new Cosach head and important member of the Guggenheim firm is to include Paris in his itinerary. Mr. Whelpley sailed Jan. 10, for London to confer with British interests in the Cosach deal before going to Chile for a conference with Chilean government officials. Young, good looking Mr. Whelpley has quite a program laid out before he will again reach Guggenheim headquarters at 120 Broadway. He must appease dissatisfaction in English circles, get a large portion of French tonnage definitely contracted for, and finally, convince the Chilean Government that Cosach terms are fair and equitable.

President Montero awaits visit of—

Lower Nitrate Prices

Meanwhile, lower prices are heard in several quarters. The nitrate price in France was reduced Jan. 7 from 105 francs to 95 francs per 100 kilos and in England I. C. I. is offering in limited quantities, synthetic sodium nitrate produced at Billingham, at the same price as Chilean nitrate. The January price schedule for sodium nitrate in 6-ton lots is £8 14s. a long ton, Feb.-June, £8 16s. freight paid to any railroad station in Great Britain, or c. i. f. Isle of Man main ports, less 7s. 6d. a ton discount. Ammonium sulfate for domestic agricultural purposes is offered in 6-ton lots for Jan.-June, 1932, at £7 a ton, with the same delivery terms as for nitrate.

The report of the Chilean Government's recent Commission appointed to investigate the entire Cosach structure has at last been made public. In it the formation of the financial arrangements are severely condemned by the Commission, but it takes the stand that at this late date little use can come from any attempt at dissolution and suggests rather several important changes. The report dated Dec. 5, 1931 and signed by Alberto Cabero, Juan Enrique Tocornal, Arturo Prat, Arturo Ruiz Gamboa, Luis Diaz Garces, Ruben Davilla and Osvaldo de Castro is as follows:

The committee believes that Law No. 4683 of July 21, 1930, was violated when Cosach was organized, inasmuch as its capital appears higher than that authorized, and because it considers that the sense of that Law as well as the aspect under which the Government presented it and the Congress placed its approval thereon concur in demonstrating that an equality of conditions, rights, and benefits, which do not exist at present between the Treasury and the manufacturers, constituted the immutable basis of its conception.

Were we not oppressed by the acute financial crisis and the era of unemployment through which we are passing, and the situation of the nitrate industry were that of the year 1929-30, in which Cosach was planned, the undersigned would not hesitate to recommend the total dissolution of the Company, in accordance with the provision contained in Article 35 of the Law, for the purpose of organizing the industry on other bases.

Excise taxes proposed for meeting in part the unemployment which this would occasion, as involving work of extracting high grade caliches, would in order to be capable of functioning with entire success require the organized existence of old companies, since it exists only on an extremely small scale, and the disposal of sufficient credits exceedingly difficult to obtain at the present time.

Suggests Continuance of Cosach

It would doubtless have been preferable for the Treasury not to enter as a partner into the organization which was planned, but to receive a certain share of its profits and to collect a royalty on fields transferred to it, at the same time reserving its right to take part in the management of the enterprise for the purpose of harmonizing the aims of the latter with the general interests of the country.

However, the fact is that it was not so done, and hence in the present situation we deem it preferable to continue Cosach, provided it be possible to confine it within the law which created it, and provided further that its debts be reduced and its contributions be revised, the same being paid exclusively in shares of stock, in such manner that distributive justice and fiscal and individual interests may be consulted and safeguarded.

In order to confine the Company within the spirit and provisions of the Law on the basis of complete equality between the fiscal contribution and that of the companies, it would be necessary to convert into shares of stock the bonds of Cosach, except those transferred to the National City Company, which represent 19 million dollars, and those placed in England, the Netherlands, Switzerland, and Sweden, amounting to three millions of gold pounds, and further, those turned over to the Treasury, at the same time reducing proportionally the $60 per ton reserved in favor of loans.

Criticizes Certain Agreements

With debts thus equitably reduced, they would not as at present overshadow the future of the industry. It is well known that those of Cosach were markedly increased by the acquisition of part of the assets of certain companies, by bonds delivered to the Treasury in payment of their quotas for the years 1932 and 1933, and by the transfer of the credit of Guggenheim Brothers against the Anglo Chilean for £5,577,724, which should not figure in the liabilities of Cosach, but in those of the Anglo Chilean.

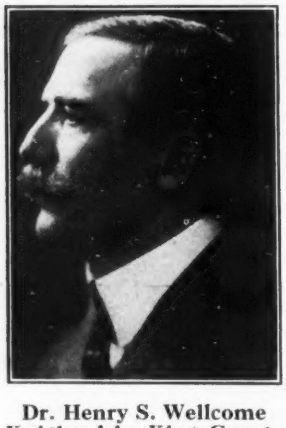
New Cosach head, M. G. B. Whelpley, to Chile

Payment for assets of associated companies should have been made in shares of Series B, and, therefore, companies which received bonds in payment for their assets should exchange them for the said B shares, so conforming with the precise terms of the Law. Outstanding bonds should, as we have said, be reduced to those actually taken by bankers, which do not exceed 34 million dollars, and to those turned over to the Treasury.

In their effort to relieve the industry, Senores Cabero and de Castro would agree to the elimination of the latter.

If possible, the contributions of all the companies, subsidiary companies included, should be revised, for the purpose of adjusting their valuations to their respective actual values, or of verifying figures already accepted for companies incorporated in Cosach, eliminating in lieu thereof the subsidiary companies, which would continue as independent companies, Article 39 of the Law being modified and their stockholders thus rehabilitated.

Were either of these two courses adopted, the fiscal contribution would be reduced or increased until if equaled that of the individual companies, so that there would be as many A shares as B shares.



Dr. Henry S. Wellcome Knighted by King George

The interest of Cosach would be better harmonized with national interests by requiring the former to designate within the period of ten years the fields which it desires reserved and to which Articles 11 and 12 of the Law refer. These fields having been selected, the Government would be at liberty to dispose of the others, transferring them on terms agreed upon to persons who apply for them, provided the activities of Cosach are not affected thereby.

Without prejudice of the foregoing, the Government would be able, in return for certain royalties, at once to transfer to independent companies fiscal fields adjacent to their present holdings, provided the said fields were not commercially exploitable by Cosach.

It is necessary to modify the application of Article 39 of the Law in such manner as to insure the right of the independent companies to operate and to guarantee the payment of expenses common to the entire industry.

Suggests Operation of Two Plants

It would be advisable for Cosach to distribute its works, so that ports of Tocopilla, Iquique, Antofagasta and Taltal would be assured of shipments of nitrate and the working population employed in the same would be increased. For the purpose of effecting this advantageous distribution, it should be arranged that two works should operate in Iquique, two in Tocopilla, two in Antofagasta, and one at least in Taltal.

It appears preferable in these circumstances and in order not to increase the stock, to suspend manufacturing in Maria Elena, substituting for the same extraction by an equal number of workers in high grade caliche.

We make this recommendation without committing ourselves concerning the primacy of one or another process of manufacture, since sufficient data relative to the superior efficacy of the Guggenheim method do not as yet exist. Only now an experimental plan is being outlined in fields cubed for the Shanks system, which will be worked by the Guggenheim method, for the purpose of determining accurately the coefficient of both yields. Such an experiment alone will enable us to estimate rationally the value of the Guggenheim patents in its double aspect of coefficient of exploitation and development of the fields.

We would also recommend reduction in the high salaries which the Company pays its directors and higher officials, which are out of proportion to the present situation, and review of accounts submitted for heavy expenses of organization of Cosach.

Finally, in view of the structure of this vast enterprise and in order that the interests of the Treasury, the owner of all its shares of Series A, may be effectively and properly considered, not only in the General Directorate of Cosach, but in all its committees, it should include representatives of the Government in sufficient number, clothed with the power to veto any of its agreements prescribed in Article 20 of the Law.

Before signing Senor Cabero stated that in his judgment the unemployment which might result in case negotiations were broken off and Cosach dissolved could be avoided by beginning immediately the construction of the section adjacent to Antofagasta of the railroad to Salta, and by granting fiscal subsidies to companies which desired to operate independently.

In England Dr. Henry S. Wellcome, president, Burroughs Wellcome & Co., pharmaceutical and fine chemical manufacturer, London, was made a knight by King George in recognition of his generous support of medical research. Knighthood was conferred in the King's New Year honor list.

In Paris the price of aluminum, which had been maintained at £85 a metric ton since November, 1930, was reduced to £80. Reduction is because German members were compelled to comply with Bruening's price-reducing decree. Cartel decided provisionally not to adopt Swiss franc as a basis.

Elimination of Iron in Glaubers Salt

In the usual process for the manufacture of Glauber's salt from nitrecake or saltcake, points out the *Chemical Trade Journal*, the method for the elimination of iron present as an impurity in the raw materials is to add milk of lime, after the acidity of the raw material has been exactly neutralized with soda ash. The iron is precipitated according to the following equation:

$$Fe_2(SO_4)_3 + 3Ca(OH)_2 = 3CaSO_4 + 2Fe(OH)_3$$

Excess of lime should not be used, otherwise there is precipitation of calcium sulfate at the expense of the sodium sulfate. The drawbacks to this method are the following: (1) Loss of sulfate corresponding to the iron eliminated; (2) the obtaining of the oxide of iron in a non-marketable form owing to its content of calcium sulfate; and (3) the introduction into the products of the impurities of the lime.

A modified process has now been suggested by R. Bigazzi ("Chimie et Industrie," Nov. 1931). In this process, after the neutralization of the nitrecake or saltcake, an excess of soda ash is added to precipitate the iron. Any excess of carbonate remains in solution when the Glauber's salt crystals are formed. There is by this process no loss of sulfate, whilst the iron precipitate, which contains basic carbonate

$$Fe_2(SO_4)_3 + 3Na_2CO_3 + 3H_2O = 2Fe(OH)_3 + 3Na_2So_4 + 3CO_2$$

of iron, can be advantageously employed for the production of copperas. Despite the higher cost of soda ash compared with lime, this modified process is stated to present a distinct economy.

Steel Barrel Production in November

Operating capacity of steel barrel manufacturers in November was 22.8%, as compared with 29.2% in October and 26.5% in September, according to Steel Barrel Manufacturers' Institute, Cleveland. Daily average productive capacity of institute members in I. C. C. barrels was 250,625 barrels, with operations at 11.5%, as compared with 250,625 barrels, with operations at 13.4% in October, and with 250,625 barrels, with operations at 7.8% in September. The average daily productive capacity in light barrels in November was 883,125 barrels, with operations at 25.9%, as compared with 883,125 barrels, with operations at 33.7%, in October, and with 883,125 barrels, with operations at 31.9% in September.

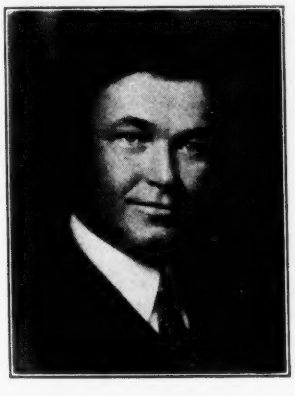
November production of steel barrels as reported to the Bureau of the Census, Washington, by twenty-seven establishments operating thirty-two plants, was 453,547 barrels, or 32.7% of capacity, as compared with 489,555, or 35.3%, in October, and with 451,562 or 31.7% in September.

	Operations (ratio to capacity)	*Production*	*Shipments*
November, 1931	32.7	453,547	444,201
Totals, 11 mos., 1931	36.5	5,602,492	5,626,845
November, 1930	36.5	497,539	500,409
Totals, 11 mos., 1930	46.3	7,023,608	7,028,044

Chemical Facts and Figures

House Committee on Military Affairs Holds Sessions—MacDowell Resigns—Herty, A. I. C. Medalist—Davidson, Carbide & Carbon Elected Vice-President—Japan Announces New Sulfate Regulations —Drug & Chemical Section Re-elects Magnus

Swann interests definitely stepped into the highly complex fertilizer picture Jan. 13, when Theodore Swann, from his 12th floor Graybar Building offices, made formal announcement of a new concentrated fertilizer said to contain 64% or more of plant food.



Theodore B. Swann
Adds new angle to fertilizer situation

Said President Swann, "The advantages of a highly concentrated fertilizer are evident when we consider that farmers are paying $30,000,000 annually for transporting and handling ordinary fertilizer, 84% of which is inert matter and of no plant food value. The new fertilizer contains 64% or more of nitrogen, phosphoric acid, and potash against the 16% found in commercial fertilizers.

Difficulties

"In developing this fertilizer, our chemists have solved a problem that has engaged the attention of agricultural chemists for many years", Mr. Swann said. "When plant foods are merely mixed together in the ordinary manner, they tend to absorb moisture and cake. They also tend to separate out of the mixture in non-uniform masses. With high concentrations, the fertilizer is therefore apt to be very difficult to apply and to distribute uniformly.

"This problem has been solved by producing the new fertilizer in granular form. The granules are hard and firm, uniform in composition, dustless, and non-caking even in damp, humid climates. Their size and shape permit them to be easily and accurately applied to the soil by means of the simplest type of mechanical distributors. Recent tests show that the granular form of this new fertilizer permits uniform distribution at a rate as low as five pounds per acre, which is a degree of uniform application that has not heretofore been obtained."

The possibility of Swann interests making some formal bid for the Shoals property with the manufacture of a complete highly concentrated fertilizer as its objective, was disclosed Jan. 7, in Washington, when Chairman Hobbs of the recent State-Federal Muscle Shoals Committee (appointed in part by President Hoover) appeared at a meeting of the House Committee on Military Affairs armed with samples of 64% fertilizer made by the Swann process by treating electric furnace phosphorus with liquid ammonia and potash salts, and explained that a similar product could be made economically at Muscle Shoals with the cheap electric power there and with Tennessee phosphate rock available via river barge.

THE MONTH REVIEWED

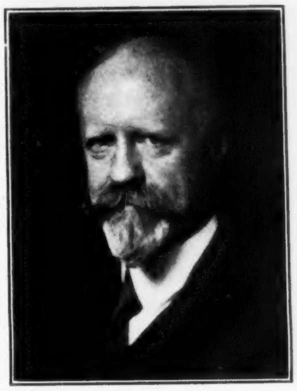
Jan.

5	Charles H. MacDowell resigns (162).
7	Lower nitrate prices in England and France (159).
11	Chilean strike against Cosach fails (159).
21	Theodore Swann appears before House Committee on Military Affairs (161).
22	Chilean Government sends Cosach data (169).
22	Freeport Texas dividend rate reduced (170).
25	Dr. Charles H. Herty wins A. I. C. medal (163).
25	Compressed Gas Association meeting (131).
29	Du Pont 1931 earnings below 1930 (172).
	Died
6	Arthur S. Somers.
30	Dr. John B. Herreshoff.

Terms

Chairman Hobbs told the House Committee that it would be impossible to interest private producers in any lease based on the Norris resolution; that too large a tonnage of fertilizer was demanded and too little leeway given to the lessee to branch out into additional chemicals other than those of a fertilizer nature.

Col. Joseph I. McMullen, of the Judge Advocate General's office, U. S. Army, a member of the commission, told the committee there would be no trouble in leasing the plants if limitations are not put on its use, which would make it impossible for any lessee to make a profit. He reminded the committee that fertilizer production is seasonal; that little or no profit could be anticipated on this business by prospective lessees; and that associated chemical enterprises must be permitted in order that the project can be operated efficiently and profitably.



William B. Bell
Cyanamid no longer interested in Muscle Shoals ?

Not Interested

In its third week of continuous sessions the House Committee, on Military Affairs it is reported, received definite assurances from Henry Ford and also W. B. Bell, Cyanamid president, that neither company was now interested in making a bid. On Jan. 21, Mr. Swann was heard in an executive session. What proposition he offered, if any, was not disclosed and the Muscle Shoals situation appeared at the end of the month to still be in very much muddled condition.

It is said in several quarters that the Military Affairs Committee is not unfriendly to the report of the President's Commission and that it will report out a bill of one sort or another based on private ownership.

Resigns

Charles H. MacDowell announced his resignation, Jan. 5 as president, Armour Fertilizer Works and vice-president, Armour and Co., effective Jan. 16, 1932, after a service of nearly forty-five years. He will continue to serve as a director of Armour and Co.

Charles H. MacDowell
Retirement fertilizer industry's loss

Mr. MacDowell is another of the large group of Armour executives who worked his way up from the ranks. After having worked as printer's "devil" on the Fulton Democrat, Lewiston, Ill., he learned shorthand and served several years as court reporter. In 1887 he moved to Chicago and that year entered the employ of Armour as stenographer. His work attracted the attention of Philip D. Armour, who appointed him his private stenographer-secretary.

In 1893 Mr. MacDowell was placed in charge of the Armour exhibit at the World's Columbian Exposition held in Chicago. While there he studied the other exhibits whenever time would permit. He was particularly drawn to the foreign agricultural and chemical exhibits. When he saw the results of the use of fertilizer in Europe and the United States in producing larger, better and cheaper cost crops he got a vision of the possibilities of the use of manufactured fertilizers in this country. As a result, he wrote a letter to P. D. Armour asking that he be allowed to take charge and develop this end of the company's business. Mr. Armour's "O.K." marked beginning in 1894 of present Armour Fertilizer Works and a more scientific utilization of packing house byproducts, many of which at that time went to waste. He planned first soap works for Armour which was built to use large quantities of tallow and grease produced at packing plants.

Founder

Mr. MacDowell served as fertilizer department manager of Armour from 1894 until 1909 when Armour Fertilizer Works was incorporated, and he became its president. Under his direction Armour Fertilizer Works developed into one of the largest fertilizer manufacturers in the U. S. Since 1923 Mr. MacDowell has been vice-president of Armour & Co.

Successor

John E. Sanford, for many years executive vice-president, will succeed Mr. MacDowell as president.

Mr. Sanford, native of Huntsville, Alabama, has spent more than a quarter century in the fertilizer industry. As salesman he traveled in most of the Southern states, and when Armour Fertilizer Works bought out Tennessee Chemical in 1909 he continued his work with Armour.

In 1913 he became assistant manager, Nashville office, and in 1916 was promoted to manager Atlanta office, one of the largest offices of the company in point of sales. His work in Atlanta was so successful that his duties were enlarged and he was made southern sales manager, directing sales in all the Southern States. In October, 1922, he was elected executive vice-president with headquarters in Chicago. Mr. Sanford is a member of the Board of Directors and Executive Committee of the N. F. A.

Obituaries

Arthur S. Somers

Arthur S. Somers, chemical manufacturer, educator, civic leader, and philanthropist, president, Fred L. Lavanburg Co., former president, National Paint, Oil and Varnish Association, died unexpectedly Jan. 6 in Brooklyn, after an illness of four days. Mr. Somers had been for forty-six years associated with the firm of which he was the head at his death.

Mr. Somers was born in Manhattan on Jan. 26, 1866. When he was six months old, his parents moved to Brooklyn. His father, Charles Edward Somers, died when the son was three years old. The boy left day school to take a job at the age of twelve and attended evening school. In later years he received the degree of M.A. from Fordham and that of LL.D. from St. John's College.

During his service of 38 years in the N. Y. City school system, which began in 1892 and had been interrupted only by

a two-year term as Civil Service Commissioner for Brooklyn in 1896 and 1897, Mr. Somers had been on every important committee of the Board of Education and in 1918 and 1919 had been president.

Mr. Somers was a former president of the Brooklyn and Long Island Chambers of Commerce. He was a trustee or director of several institutions and corporations, among them the Manufacturers' Trust Co., the National Liberty Insurance Co., and the Brooklyn-Manhattan Transit Corporation.

Dr. John Brown Herreshoff, 81, past A. C. S. president and first American Perkin medalist died in Atlanta, Jan. 30.

Member of the famous Rhode Isalnd family of yacht designers, Dr. Herreshoff, after a brief period as professor of analytical chemistry at Brown, devoted himself to industrial chemistry and to research. He was vice president and a trustee of Nichols Copper and honorary vice president of General Chemical. For last fifteen years he had not been active, and since 1927 had lived quietly in Atlanta.

He was born in Bristol, R. I., a son of Charles Frederick and Julia Ann Lewis Herreshoff. He graduated in 1870 from Brown, which awarded him the degree of A. M. and Sc. D. some years later. He invented a process for manufacturing sulfuric acid, and received the Perkin medal for work in chemical and metallurgical industries, its first award in America.

U. S. Circuit Court of Appeals for 5th District denied right of Dry Ice Corp. to enjoin Louisiana Dry Ice Corp. and Joseph S. Belt individually and trading as J. S. Belt Helium Interests from use and collocation of the words, "dry" and "ice," in their corporate title, labels, printed matter, containers, and advertising. The decision was rendered Jan. 8.

Chemical Business at a Glance

Shipments
Improvement over December reported

Prices
Slightly lower, reductions mostly in specialties

Employment
Slight Improvement

Payrolls
Slight Improvement

Inventories
Held at low levels

Stock Prices
Lower

Bond Prices
Lower

Medalist

Dr. Charles H. Herty was announced, Jan. 25, as the 1932 recipient of the American Institute of Chemists medal "for noteworthy and outstanding service to the science and profession of chemistry in America".

Dr. Charles H. Herty
"For noteworthy and outstanding service"

Former recipients include Secretary of the Treasury Mellon and his brother, Richard B. Mellon, who won it last year for establishing the Mellon Institute; George Eastman, and Mr. and Mrs. Francis P. Garvan, who established the Chemical Foundation.

Medal will be presented at annual meeting of the institute in May. The award was made to Dr. Herty "in recognition of his efforts over a long period of years in behalf of American chemists and the American chemical industry." Dr. Herty's early researches at the University of Georgia revolutionized the turpentine and naval stores industry. During 1915-16, when he served as president of the A. C. S. he cooperated in mobilizing the chemical man-power of the country and in taking a chemical census which presented the National Government with a detailed view of the chemical potentialities of the country. In 1917 he helped the Chemical Warfare Service as a separate branch of the army. He worked for the tariff act in 1922. In 1926 he became adviser to the Chemical Foundation.

More recently Dr. Herty has carried on extensive researches proving the possibilities of making paper pulp out of slash pine. The work is now being perfected commercially in the new laboratory built for the State of Georgia by the Chemical Foundation.

Repeats

William H. Nichols medal of the N. Y. Section of the A. C. S. for 1932 awarded to Prof. James Bryant Conant, chairman, Division of Chemistry, Harvard.

Award, the second outstanding scientific honor to be won by Prof. Conant this year, recognizes his work in organic chemistry, particularly in the chemistry of chlorophyll. He received Chandler medal of Columbia University on Feb. 5, and will be presented with Nichols medal March 11.

At the Nichols medal ceremony Prof. Conant will deliver an address on "An Introduction to the Chlorophyll Molecule." Dr. Walter S. Landis, chairman, N. Y. Section and vice president, American Cyanamid, will preside. Prof. James F. Norris of M. I. T., and Prof. Hans T. Clarke of the College of Physicians and Surgeons of Columbia will be the other speakers. Prof. Conant in his Chandler medal address discussed "Equilibria and Rates of Some Organic Reactions."

Prof. James B. Conant
Receiving medals is a habit

Prof. Conant, one of the most brilliant of our younger organic chemists, was born in Dorchester, Mass., in 1893. After attending the Roxbury Latin School for six years he entered Harvard, where he received an A. B. in 1913 and his Ph. D. in 1916. Upon his graduation he became an instructor in chemistry at Harvard, and in the following year entered the army as a lieutenant in the Sanitary Corps, later becoming a major in the Research Division in the Chemical Warfare Service.

At the close of the war, Prof. Conant returned to Harvard as an assistant professor of chemistry. He became an associate professor in 1925, and a full professor in 1927. Meanwhile he had acted as a visiting lecturer at the University of California Summer School.

COMING EVENTS

A. C. S., Rubber Division, Detroit Feb. 25-26.

American Chemical Society 83d meeting, New Orleans, March 28-April 1.

American Drug Mfrs. Association, Greenbrier, White Sulphur Springs, Apr. 18-21.

American Institute of Chemical Engineers, spring meeting, Schenectady and Corning, N. Y., June.

Electrochemical Society, Spring Meeting, Baltimore, Apr. 21-23.

International Congress of Pure and Applied Chemistry, Madrid, Spain, April 3-10.

N. Y. Board of Trade, Drug & Chemical Section, dinner March 15, Hotel Commodore

Technical Association of the Pulp and Paper Industry, N. Y. City, third week of February.

Washington

With both the Senate and the House deeply engrossed in the intricacies of the Reconstruction Finance Bill, with the foreign debt situation, the forthcoming Geneva meeting, and the Japanese-China flare-up demanding immediate attention from the executive branch, matters of a chemical nature were decidedly in the background during the opening month of the new year.

Nevertheless, in several of the committees questions chemical in nature were given consideration. The muddled and confused condition arising from the number of bills introduced looking to some solution of the Muscle Shoals problem remained unchanged and it is quite unlikely that any consideration will be given to the question by either the House or the Senate for several weeks at least. Hearings before the House Committee on Military Affairs are described elsewhere, as is also the attempt to link up Chile's present inability to pay her external debts with the formation of the Cosach.

Drys

Anti-Saloon League in convention at Washington heard Dr. Doran on Jan. 18, say "Business, industry and professional groups are showing a greater determination than ever before to co-operate with the Government in law enforcement, particularly as the National Prohibition Act is involved."

"In turn they are entitled to our co-operation and that of this organization. I know of no better way to secure respect for prohibition law than to deal fairly and considerately with honest merchants and medical men who must operate under the permissive sections of the National Prohibition Act.

"Our control policy with respect to allocating and limiting total production of alcohol continues to show good results. It steadies the industry and removes the incentive to divert any excess."

Tariff

The Tariff Commission announced Jan. 20 that it had denied and dismissed without prejudice application for investigation for an increase in duty on antimony oxide, antimony regulus, or metal. Application was filed last november by the Texas Mining & Smelting Co.

Also the Commission held Jan. 26 a public hearing on the differences of costs of production on paragraph 302 (j) of Title 1 of the tariff act, silicon aluminum, aluminum silicon, alsimin, ferrosilicon aluminum and ferroaluminum silicon.

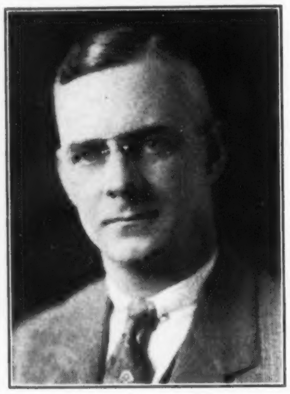
Dr. Henry G. Knight (Bureau of Chemistry and Soils) reported Jan. 18 successful development of a method of filtering gum will be one of the most important contributions of the Department of Agriculture to the naval stores industry.

Appearing before the House appropriations committee during hearings on the departmental money bill for the fiscal year beginning July 1, next, Dr. Knight declared that the development of this method is one of the highlights of the past year's work.

"It has always been thought that it was impossible to filter turpentine gum," he explained, "but we have worked out a method which we feel will prove satisfactory. We can take very dirty gum and put it through this process, and we are able to produce high grade gums and resin."

Personnel

Provident Chemical Works' Directors, Jan. 28, elected the following officers: Sidney H. Thomson, chairman of the board; P. Val Kolb, president; Frank R. Deutman, vice-president in charge of operations; Douglas L. Boyer, vice-president in charge of sales; R. S. Thomson, secretary and treasurer; J. B. Robinson, comptroller. Directors are: S. H. Thomson, chairman; Theodore Swann; P. Val Kolb; Frank R. Deutman; S. W. Fordyce; and S. B. Jeffries.



P. Val Kolb
Now directs Swann subsidiary

Sidney H. Thomson, for many years president of the company, was promoted to office of chairman of the board of directors after 36 years of active service. P. Val Kolb, new president, has acted as vice-president and general manager for the past five years. Frank R. Deutman, vice-president in charge of operations, has been with the company for 31 years.

Now Vice-Pres. Davidson

J. A. Rafferty, president Carbide and Carbon announced Jan. 28 that Dr. J. G. Davidson was elected vice-president of the Corporation at a meeting of the Board of Directors held on Jan. 14, 1932. Also the appointment of W. F. Reich, Jr., as general sales manager effective immediately.

J. A. Rafferty
Announces Davidson election as vice-president

Dr. Davidson, who served the Corporation as director of chemical sales during the period 1923-30 and later, during 1930-31, as general sales manager, has been notably successful in chemical industry since the conclusion of his scientific investigations at Mellon Institute. He has devised and applied a number of novel and effectual procedures in chemical merchandizing research, and has distinguished himself by utilizing effectively the results thereof in introducing new chemicals, the scientific creations of the Carbide & Carbon Chemicals Corporation, to the chemical profession, to the industries, and to the public. In thus cultivating fields of uses for novel chemical products, he has served valuably both science and technology.

Dr. Davidson was born in New York in 1892. He received his undergraduate training in chemistry at the University of Southern California, where he was awarded the degree of A.B. in 1911. He then pursued a year of graduate work in that institution, securing his A.M. in 1912. He served as instructor in chemistry at Los Angeles Junior College during 1914-16, and in 1917 was given a fellowship at Columbia. In 1918 Columbia conferred on him the degree of Ph.D. and shortly thereafter he became an industrial fellow and later a senior fellow of Mellon Institute, a post that he occupied with conspicuous success until he entered the employ of the donor of his fellowship, Carbide & Carbon. During his work at Columbia and later at Mellon Institute Dr. Davidson specialized in hydrocarbon chemistry.

Joseph G. Lewis, Weller Noble and J. C. Baldwin re-elected members, executive committee, California Fertilizer Association, to serve three years.

Pacific Coast Borax Directors appointed F. M. Jenifer a general manager, and F. T. Winters was appointed assistant general manager.

Executive staff now consists of the following:—R. C. Baker, president; C. B. Zabriskie, vice-president, treasurer, and general manager; F. M. Jenifer, vice-president and general manager; F. T. Winters, secretary and assistant general manager.

Davison Changes

John P. F. Ritz, president, Miller Fertilizer, subsidiary, Davison Chemical, elected vice-president and director of Davison Chemical, filling vacancy caused by resignation of Warner D. Huntington. C. A. Fulton, executive vice-president, Southern Phosphate, another subsidiary of the latter company, elected director of Davison Chemical.

Du Pont reported appointment of Dr. E. H. Kilheffer as manager, fine chemical division, sales advisor, organic chemical department; and president, Acetol Products, Inc.

H. H. Wolf, Grasselli, will call upon the trade in and around the metropolitan territory. He had previously been confined to sales office.

Henry A. Weidman, who has been manager chemical division, Schering Corp. for the past three years, will sever his connections April 1.

Grasselli Changes

A. L. Davis, for a number of years connected with Grasselli at Pittsburgh resigned Jan. 1. Ross H. Smith, formerly connected with Pittsburgh Office, and more recently with the miscellaneous chemicals division at Cleveland, returned to Pittsburgh as branch manager.

After more than thirty years of continuous management of the St. Louis district, Charles E. Fisher resigned Jan. 1. Mr. Fisher has been succeeded by Howard E. Davis, formerly connected with Chicago Office, and more recently in charge of miscellaneous chemicals division at the Cleveland Office.

W. H. Lohman, vice-president and general manager, United Zinc & Smelting Corp., elected president, succeeding Ben Lissberger.

Leon V. Quigley severed his connection with Bakelite and established himself as Counsel on Public Relations at 730 Fifth ave., N. Y. City.

Frank Edwards, connected with heavy chemical department Grasselli Chemical for twenty years, severed connections with the company. He is now associated with the Swann Chemical Corp.

Personal

Honored. Dr. Edward C. Franklin, professor, organic chemistry at Leland Stanford nominated for the 1932 award of the Willard Gibbs Medal. Dr. Franklin is a former president of the A. C. S. and received the William H. Nichols Medal in 1925.

Honored. Prof. Arthur A. Noyes, director Gates Chemical Laboratory, California Institute of Technology, chosen as first recipient of Richards Gold Medal for conspicuous achievement in chemistry. Award announced by Prof. William P. Ryan, chairman, Northeastern section, A. C. S.

Honored. James T. Skelly, vice-president Hercules Powder, elected president of the Old Guard Southern Hardware Salesmen's Association at the annual meeting.

Engaged. John M. Cabot, son of Mr. and Mrs. Godfrey L. Cabot to Miss Elizabeth Lewis of Mexico City, Mex. Mr. Cabot is third secretary of the American embassy in the Mexican capital.

Born. A daughter to Dr. and Mrs. Robert K. Lambert. Mrs. Lambert is the former Miss Maxine Toch, daughter of Dr. and Mrs. Maximilian Toch.

Died. Dr. Arnold H. Peter, 69, retired chemist formerly with Royal Baking Powder. Born in Switzerland, he was educated in Zurich and for a time was attached to a dye plant near Paris. Later, in Germany, he perfected a process for dyeing wool, came to this country to exploit it about 35 years ago. Remaining, he was consulting chemist for tanneries in Philadelphia, Milwaukee, and Peabody, Mass., before becoming associated with Royal Baking Powder.

Died. Mrs. Elizabeth Stevens Merz, wife of Eugene Merz, Jan. 6 in her home in Florham Park, N. J.

Died. George Perry Fiske, 76, one of the founders and a retired executive of Fiske Brothers Refining on Jan. 15.

Died. William F. Cochrane, assistant to president, U. S. Industrial Alcohol, Jan. 5, in his home in Baltimore after a long illness. He was born in Steele, N. D., in 1886, and was graduated from U. S. Naval Academy in 1907. He had been connected with the alcohol company since the World War.

Died. George M. Potter, 63, former president, Cleveland Chemical Co.

Died. John B. Swift, 81, retired chairman of the board, Eagle Picher Lead on Jan. 12.

Died. Paul Watkins, 67, president J. R. Watkins Co., suddenly from a heart attack.

A Zimmerli, formerly chief chemist Rhodia Chemical now a consulting chemist at 303 Grant ave., New Brunswick, New Jersey.

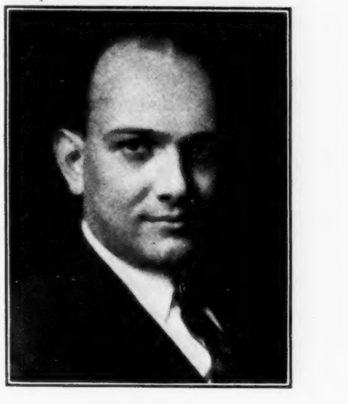
Dr. H. J. Barrett, duPont, research chemist addressed Chemistry Club of University of Richmond, Jan. 8. Subject "Organization of and Qualifications for Industrial Research."

Roger Williams, chemical director Ammonia dept., du Pont toured Middle West, speaking on "Alcohols from Water Gas."

E. G. Klenier, consulting chemist for Pacific Coast Borax appointed German consul in Los Angeles.

Sounds Keynote

Chairman Magnus, Drug and Chemical Section, N. Y. Board of Trade, in rendering an account of his stewartship sounded the keynote of a new policy on the part of American business men on the subject of taxes. Said Leader Magnus, "In his individual and business capacity, the American Drug and Chemical Executive is giving more careful attention than ever before to every economy that he may practice in his business life, not merely to keep his own solvency, but also to see the continuance of his enterprise. At this time, therefore, is it not logical that he should give serious consideration to an important part of his expense of doing business, namely Taxation! From the legislative halls, we are hearing the call for increased rates rather than a decrease of Government costs. It seems peculiarly out of order that Governments should attempt to maintain the high levels of taxation in these days of decreased incomes whereas this serious problem and situation, in my opinion, can be partially alleviated by other means such as drastic reductions in operation forces and many other economies that have been successfully applied to and by business interests. Much can be discussed in this direction and if I may suggest it at this time, I believe this subject should be carefully reviewed and considered by our Executive Committee."



Percy Magnus
"Chemical executives are giving thought to taxes"

New officers of the Section are: Chairman, Percy C. Magnus, Magnus, Mabee & Reynard; Vice-Chairman, Francis J. McDonough, N. Y. Quinine; Treasurer, S. B. Penick, S. B. Penick; Secretary, Ray C. Schlotterer. Representative of the Drug, Chemical and Allied Trades Section as Director in the N. Y. Board of Trade, Inc., Charles A. Prickitt, The Upjohn Co., Executive Committee: S. W. Fraser, Burroughs, Wellcome; Albert A. Teeter, Charles Pfizer; C. Leith Speiden, Innis, Speiden; A. Bakst, Bakst Brothers; Gustave Bayer, Merck; Victor E. Williams, Monsanto.

United Chemical Suit

Chancellor J. O. Walcott, Wilmington, signed an order directing Laurence A Slaughter, Washington, to file bond of $500 to guarantee costs that may be incurred in injunction suit filed before the court recently by Slaughter against United Chemicals, Inc., of N. Y., a holding company.

Slaughter asked the court to declare illegal proposal of United Chemicals to exchange 11,568 shares of 7% cumulative preferred stock of Westvaco Chlorine, formerly held in treasury of United Chemicals, for 34,704 shares of United Chemicals preferred on the basis of one-third share of Westvaco for one share of United Chemicals preferred.

Dismissed

The injunction was dismissed by Chancery Court and costs assessed on the complaint. Dismissal ordered because of failure of Mr. Slaughter to file a bond of $500 to guarantee payment of court costs in the litigation.

Employment

Severe declines were registered in both employment and payrolls in three branches of chemical industry in December according to the Dept. of Labor statistics, while one, fertilizers showed an increase which was mainly if not wholly seasonal in its nature. Comparison of the indices given below disclose the fact that the declines in chemical and allied products and also chemicals were greater than the general average. In petroleum refining the declines were about equal to the general decline.

Employment	*Dec. 1930*	*Nov. 1931*	*Dec. 1931*
Chemicals and allied products	85.9	72.0	71.0
Chemicals	92.2	83.3	80.7
Fertilizers	74.9	46.8	48.5
Petroleum refining	82.5	67.4	67.3
General average	75.1	65.4	65.3
Payrolls			
Chemicals and allied products	85.2	67.7	66.7
Chemicals	89.7	76.8	74.2
Fertilizers	70.2	38.3	41.2
Petroleum refining	83.6	64.2	64.1
General average	67.4	51.0	50.9

Nichols Copper, subsidiary, Phelps Dodge and American Smelting & Refining reduced operations at their El Paso, Tex., plants. This is in line with recent world agreement of producers and follows action by Phelps Dodge and by Anaconda at its Butte, Mont., properties.

Monthly production of Nichols refinery will be 3,000 tons instead of 8,000 tons, cuts to be effected gradually, receiving from Calumet & Arizona furnaces about 6,500,000 pounds of copper monthly, instead of the former 17,500,000 pounds.

Ashmead F. Pringle and E. Strudwick Nash applied to Secretary of the State of South Carolina for a charter to be known as the Merchants Fertilizer Co. It is understood that a reorganization of the Merchants Fertilizer & Phosphate Co. of Charleston is contemplated.

The Narco Co., organized at 447 Wood st., Decatur, Ill., to deal in chemical and medicinal preparations.

Morningstar, Nicol filed a request with the Tariff Commission for an investigation looking toward a decrease in the duty on both dark and light albumen.

N. Y. Court of Appeals, Jan. 5, affirmed with costs judgments of lower courts in favor of Canadian Industrial Alcohol against Dunbar Molasses. Action had to do with complaint of breach of contract of purchase and sale of refined blackstrap molasses.

Eastman Kodak Co. went into production of wrapping material known as Kodapak, manufactured from cellulose acetate.

R. L. Cawood, president, Paterson Foundry & Machine Co., announced the formation of the Paterson Engineering Corp. Company will engage in the design of machinery for rubber, plastics, and fuel industries. Associated with Mr. Cawood is P. E. Welton, consulting engineer and R. B. Koontz formerly president of the Adamson Machine Co. New company established offices in Akron.

Cement Lime Specialties, Inc., Staunton, Va., granted charter to manufacture and deal in chemicals, oils, pigments and compounds derived from lime and gypsum.

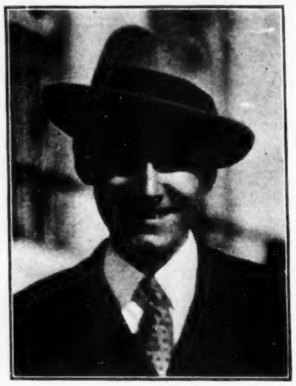
Washington Soda Products Co., Smith Tower building, Seattle, reported large body of natural bicarbonate near Warden, Wash.

Magnesium Development Co. formed by Aluminum Co. of America and I. G. to develop and utilize magnesium. New company will have advantage of technical experience and own patents rights of Aluminum Co. and I. G. Walter H. Duisberg will head new company and its board will be named by the two interests.

Company News

John Campbell & Co., discontinued offices at Providence, R. I. All correspondence should be addressed to Boston office at 99 Bedford st., or New York office at 75 Hudson st.

American Cyanamid announced two series of radio talks, one to be given over WMC, Memphis, and the other over WGY, Schenectady. First series, will be heard over WMC every Wednesday at 12.30 P. M., Central Time. The WGY program will begin Feb. 16 at 1 P. M. R. H. Benton, Jackson, Miss., office will discuss use of cyanamid on cotton, corn and vegetables; J. B. Abbott will talk on grassland fertilization and management.



A. K. Hamilton
Announces St. Louis representative

J. E. Niehaus & Co., 429 S. 12th st., St. Louis, appointed representative for A. K. Hamilton, for the sale of Pennsylvania Sugar's alcohol; also for the sale of solvents, diluents, nitrocellulose and gum solutions, made by Franco-American Chemical.

Sherlow Chemical now located at 145 Nassau St., N. Y. City.

Miller-Baker Chemical Co., newly organized by Baltimore capital assumed the chemical business of the Bardley-Baker Co. of Baltimore.

American Hard Rubber Co., one of the oldest established firms in Queens, N. Y. City closed down part of its College Point plant and moved two of its departments to its auxiliary plant at Butler, N. J. This action was interpreted as meaning that the concern, hit by the impending lack of rail facilities, was planning, eventually, to move from Queens entirely.

Niacet Chemical reported Jan. 18 theft of 3,000 lbs. of mercury from its Niagara Falls plant.

Lancaster Processes, Inc., formed to manufacture and to issue licenses to manufacture variety of chemical products made from asphalt and waste paper by an entirely new process which has just been developed.

New company purchased patents and good will of Emulsion Process Co., and has put into operation a plant producing asphalt emulsion. In addition to the normal uses, the emulsion will be employed in connection with waste products to produce roofing shingles, roofing felt, waterproofed wallboard, imitation leather, floor coverings and materials for road construction. Company leased old plant of the General Bronze Co. in Long Island City for the installation of its first manufacturing and demonstrating unit.

Charles B. Crystal Co., Inc., formerly at 11 Cliff St., N. Y. City, is now located at 11 Park Place.

Texas Potash Co., Dallas reported planning construction of potash refining plant and mine unit at its potash beds near Odessa, to cost $2,500,000. Company owns 12,000 acres of land, underlaid with potash at workable depth. It has been making test-hole explorations of property for some time past. Main shaft will be 2,100 feet deep. Mining operations will be started during present year, officials of company report.

Federal Court, Wilmington, permitted filing of appeal by Union Solvents from court order enjoining it from infringement of Weizmann process for manufacture of butyl alcohol in suit brought by Commercial Solvents. Court ordered Union Solvents to file bond of $250,000. Appeal will be taken to Circuit Court of Appeals in Philadelphia. Union Solvents is ordered to file monthly statements of its business with court.

Monsanto announced production of tricresyl phosphate, a product used as a plasticizer in lacquer and other industries.

Iowa Soda Products, Council Bluffs, Iowa, is planning to rebuild its plant which had been destroyed by fire early in December. At present time the company is handling business from its warehouse, which was not damaged by the blaze.

Combustion Engineering announced appointment of Charles McDonough as publicity manager succeeding Carl Stripe, who has resigned to publish a new monthly magazine to be known as Steam Plant Engineering. Mr. McDonough has been identified with the Company for the past fifteen years, having served as assistant publicity manager for some time prior to his present appointment.

Niagara Chemical Manufacturing Co., Buffalo, organized to establish and operate local plant for the manufacture and distribution of chemical products.

S. A. Tilden, formerly sales manager, Chicago Starch Wks. now affiliated with Victor G. Bloede Co., of Baltimore.

Sulfate Restrictions

Japan acted on a new set of ordinances Dec. 7 governing the importation and exportation of ammonium sulfate. The following are the more important provisions of the ordinances:

Article 1. All fertilizers containing an 80 per cent or more of sulfate of ammonia shall be regarded as sulfate of ammonia in these ordinances.

Article 2. Persons wishing to import or export sulfate of ammonia shall receive permit from the Minister of Agriculture and Forestry for the time being.

Article 3. Persons wishing to receive such permit shall apply by filling the following points: 1. Amount. 2. Name of port of or importing port. 3. Time of exportation or importation. 4. Place of production. 5. In case a person who has received permit for importing sulfate of ammonia according to the Fertilizers Control Act is required to give the name of the fertilizer he wants to import, its amount, and the name of the government office that gave the permit. A person wishing to import fertilizers under Clause 2, Article 1, is required to give the name of the fertilizer and the percentage of crude sulfate of ammonia contained. The amount of each fertilizer should be also specified under Point 1, Clause 2, Article 1.

Article 5. Persons wishing to receive permit for the exportation of sulfate of ammonia must presenr applications after filing the following points to the Minister of Agriculture and Forestry and to the Minister of Commerce and Industry: 1. Amount. 2. Port of shipment. 3. Port of landing. 4. Time of exporting. 5. Name of manufacturers. Provisions of Clause 2, Article 3 may be used when an application is made for the exportation of fertilizers under Clause 2. Article 1.

Article 7. When the Minister of Agriculture and Forestry or the Minister of Commerce and Industry grants permit for the importation or exportation of sulfate of ammonia, he shall specify the period of importation or exportation as the case may be. Permit shall become void in case exportation or importation is not carried out during the specified period. The Ministers may be authorized to extend the period in case of necessity.

Article 10. Manufacturers of sulfate of ammonia shall make report of their forecast output for each year between August 1 and July 31, following year to the Ministers of the two Departments before July 31. In order to make a revision of such forecast, output reports shall be made with the same Ministers. The manufacturer shall make reports of output for each month before the tenth of the following month to the same Ministers.

Article 11. Persons wishing to export sulfate of ammonia during one year between Aug. 1 and July 31 shall make reports of the amount forecast and the period of exportation before July 31 each year to the Ministers of the two Departments. In case any changes have been made in the plan of exportation, the period of 60 days may be shortened in case such a curtailment would have no effects on the condition of demand and supply of sulfate of ammonia.

Article 13. Persons having imported or exported sulfate of ammonia within the empire shall make reports of the same to the Ministers of the two Departments, by filling in the following points: 1. Amount. 2. Name of manufacturers. 4. Date of importation or exportation.

Article 15. An imprisonment of not exceeding three months or a fine of not more than 100 yen shall be imposed upon any one who is guilty of one of the following acts:

(1) Exported or imported sulfate of ammonia without receiving permit as provided in Article 2.

(2) Exported or imported sulfate of ammonia within the empire without having received a report thereon as provided in Article 11 or Clause 7 of the supplementary rules, or expected or imported in excess of the specified amounts.

(3) Failed to make reports according to Clause 4, Clause 5, or Clause 6 of the supplementary rules or to Article 8, or Article 9, or Articles 10 or Articles 13.

Japanese Imports

Fertilizer imports comprised about 70% of Japan's total chemical importations during 1930, according to a recent report of the Chemical Division of the Dept. of Commerce. Such purchases had an aggregate value of $65,000,000—a considerable reduction from the 1929 figure of $89,000,000. The decline was characteristic of both chemical and organic fertilizers. The reduction in the quantity of fertilizers imported, however, was not as great as the decline in value would indicate.

Sources

Imports of sodium nitrate—principally from Chile—declined from about $5,000,000 in 1929, to $1,500,000 in 1930. The United States furnished a value of $2,000,000 of ammonium sulfate, while Germany, the leading source, supplied approximately $8,500,000. The United States was the source of about 35% of the phosfate rock imported in 1930, the value of the total purchases being $6,000,000. Imports of this commodity from Egypt gained slightly over the preceding year to a value of about $,1,500,000 in 1930. While the quantity of bean-oil cake imported increased, the value declined from $32,400,000 in 1929 to $28,850,000. This product, used also as feedstuff, is purchased from China.

Chemical Advertising

How much should a chemical company spend on advertising? L. D. H. Weld, director of research for McCann-Erickson Advertising Agency in N. Y. City, writing in the January issue of *Nation's Business* on the subject of "Putting Science into Advertising" quotes figures recently compiled by the Association of National Advertisers which show the average expenditures for various important industries, expressed as percentages of sales. These figures are:

Drugs & Toilet Articles	19.6
Paints and Varnishes	6.4
Chemical & Allied Mfg.	6.1
Electrical & Radio	5.9
Jewelry & Silverware	5.7
Food	5.6
Office Equip. & Supplies	5.3
Hardware	4.7
Travel & Transportation	4.6
Household Equip., other than Elec.	4.5
Agri. Equip. & Supplies	4.1
Clothing	3.8
Furniture	3.7
Automotive	3.5
Leather & Shoes	3.2
Textiles	3.0
Building Materials, Const.	2.8
Paper & Paper Products	2.6
Metal, Machinery, etc.	2.5
Industrial	2.3
Financial & Insurance	1.1

Said advertising expert Weld, "These figures provide a rough gauge for any individual company If an automobile company is spending substantially more or less than the average of 3.5% shown in this table, it at least has reason to know that it should carefully analyze its advertising and other selling costs, to determine whether it has a reason for departing from common practice in the industry."

Director Weidlein, Mellon Institute, announced that Lukens Steel Co., has established an Industrial Fellowship whose purpose is the scientific investigation of processes employed in the manufacture of steel plates. Erle G. Hill, who received his professional education at the University of California, has been appointed to the incumbency of this Fellowship.

Southern Construction

Manufacturers Record, Jan. 14, printed an impressive list of industrial chemical plants completed or started during 1931 in the southern section.

Southern-Advance Bag & Paper, controlled by Advance Bag & Paper of Boston, undertook $2,000,000 improvements at its Hodge, La., paper mill. Southern Kraft Corp., controlled by the International Paper, completed at a cost of $10,000,000 at Panama City, Fla., country's largest kraft paper mill. Southern Alkali, an affiliate of Pittsburgh Plate Glass and Cyanamid, began initial operations at Corpus Christi, Texas, estimated to involve an ultimate expenditure of $10,000,000. At Wilmington, N. C., experiments are under way by Dow Chemical for extraction of bromine from seawater, looking to the erection of a plant to cost perhaps $2,000,000. The Arundel-Brooks Concrete Corp. completed a plant on Baltimore's waterfront with an initial capacity of 1000 cubic yards daily. A subsidiary of the Texas Co., completed a $2,000,000 plant at Tulsa, Okla., for the manufacture of chemicals used in the petroleum industry. Tennessee-Eastman Corp. built a $1,000,000 cellulose acetate plant at Kingsport, Tenn. Sylvania Industrial Corporation pushed work on a $1,000,000 addition to its plant at Fredericksburg, Va., the first unit of which was completed in the preceding year. Brown Paper, Monroe, La., expended approximately $5,000,000 for improvements. Champion Fibre Company, Canton, N. C., in October launched a plant expansion program to involve an expenditure of over $1,000,000.

Engaged

Blaw-Knox appointed M. I. Dorfan as manager of new Dust Collector Division. Mr. Dorfan just resigned position as manager of the Dust Collector Division of the Pangborn Corp. He was previously in charge of dust collector sales for Allis Chalmers.

Blaw-Knox Co., after long experiment and research, is entering the dust collector field with two lines of equipment developed and ready for the market and other lines in process of development.

Fertilizer Imports into Japan

(In hundreds of kin[1])

Item	*1929*	*1930*	*Item*	*1929*	*1930*
Sodium nitrate	1,476,118	509,575	Fish guano	48,378	78,391
Ammonium sulfate	6,344,299	5,048,414	Bean-oil cake	13,863,458	14,829,044
Potassium sulfate	903,391	1,131,953	Cottonseed-oil cake	976,246	1,368,750
Potassium chloride	459,843	398,521	Rapeseed-oil cake	1,160,579	600,646
Phosphate rock	9,317,844	9,505,955	Other oil cake	258,211	259,808
Other manures	1,974,572	916,745			

[1]The kin equals 1.32 pounds.

N. Y. Section Reports

Victor E. Williams, chairman, committee on manufacturing chemists, Drug and Chemical Section, N. Y. Board of Trade submitted committee's report at annual meeting Jan. 10, "manufacturing chemical industry reports that business

Victor E. Williams
Reports deed of tariff study

generally during 1931 was not as active as that reported for 1930, although in a few cases profits were better than the previous year, but generally a decrease was registered. The year was featured by a satisfactory volume in tonnage, but as selling was at low prices, and, in numerous cases, at below costs, profits were disastrously affected.

Keen competition has brought about a dangerous situation due to the anxiety on the part of some manufacturers to transact business on unprofitable terms and discounts, which, if continued, will only result in insolvency. Many cases are evident where a customer's business is being financed by a manufacturer's generous credit allowance.

Anti-Trust Laws

During the year the business world has been discussing possible changes in the anti-trust laws, which would bring about stabilization, and balance production with consumption. This does not apply to the fundamental idea of the laws—prevention of a monopoly—but due to changed economic conditions some of the provisions have become inconsistent and could be easily remedied. We are suffering more from overproduction and unregulated competition today than from a loss of individual freedom and initiative. Controlled production would eliminate wage difficulties, business depression and loss of income.

At present, agreements among manufacturers to limit output to the demands of consumption are illegal as a combination in restraint of trade. Business would benefit by an amendment to the Sherman Act, and also to the Clayton Act, so that agreements could be made for stabilizing production and to prevent destructive and wasteful practices in industry.

During economic stress and strain, competitive organizations, monopolies and cartels created abroad can show greater evidence of their power in affecting the prices of American chemicals. Currency depreciation has enabled many foreign countries to undersell the U. S. in the world market, while at the same time it forbids the sale of our goods in their moneys by prohibitive prices. We look forward to growing restrictions in international commerce, continued pressure on commodity prices, and further loss by the gold standard nations of their competitive export trade. We feel that the tariff is more essential today than when it was enacted in 1930, and that the Tariff Commission, which corrects the difference in the costs of production here and abroad through its modification of present rates, should make a thorough study of these conditions.

Consolidations

There have been fewer consolidations during the past year. American chemical industry in its desire to progress has intensified its research. Low inventories have been the rule, and we find a demand for small quantities with orders more frequent. It is the opinion of your committee that when a turn does come the effect will be almost immediate on account of the present "hand-to-mouth" buying. It has been necessary to curtail in many plants, thus economies have been effected. We feel that the industry depends for its success upon a protected home market and this condition should not be changed. We export approximately 8% of our products, the other 92% being sold in the American domestic field.

We believe the coming year will probably be one of the "Survival of the fittest", and those institutions with foresight and careful management will survive, whereas those who follow the lines of volume and no profit are likely to suffer badly. Intensive study and the application of sound business methods should be our motto for 1932.

Assisting Chairman Williams were R. D. Keim, E. R. Squibb; H. A. Stebbins, Merck; A. A. Teeter, Chas. Pfizer; and A. A. Wasserscheid, Mallinckrodt.

"Plucking Granny's Old Gray Goose to make a Feather Bed"

New York Tribune Inc.

J. T. Baker Fellowships

Mid-Western Division J. T. Baker Fellowship for the academic year, 1931-32 is held by Herman C. Fogg who worked with the late Professor James at the University of New Hampshire. He will work at Michigan, under direction of Dr. H. H. Willard. Mr. Fogg will work on precipitation of basic salts by means of urea, carrying on the work already started there along that line, but taking up other elements of the aluminum group, such as indium and gallium, as well as some of the common elements.

Eastern Division Baker Fellowship is now held by Nelson Allen, Dept. of Chemistry, Centre College. Mr. Allen will do research work on the determination of fluorine at Princeton, under direction of Dr. N. H. Furman.

In addition to the foregoing Fellowships described, J. T. Baker Chemical (representing State of New Jersey) maintains a four year fellowship in chemical education at Johns Hopkins.

Salt

Salt water encountered in drilling for oil in large areas of West Texas reported to contain large percentages of sodium chloride, calcium chloride, bromine and various magnesiums.

Gas in many of these wells is of sufficient quantity for utilization as fuel under boilers of refineries to evaporate salt water and recover its contents. Construction of one or more refining plants for recovery of saline products now under consideration.

Unemployment

Organization of The Committee on Unemployment and Relief for Chemists and Chemical Engineers, sponsored by chemical and allied societies of the N. Y. metropolitan area, is complete and the Committee is now operating in the attempt to find work and assistance for the unemployed members of the profession living in this area. Employment has been found for a number of men.

Two main problems confront the committee—First; the providing of immediate relief, either by means of temporary or part time work or by actual loans to cover food and housing, for those who have no resources and are now in dire need and second, the providing of work for those unemployed in advance of the time when their resources become exhausted.

The Financial Markets

Chilean Government Answers Senate Finance Committee—Stocks Go Lower in January—Freeport Texas Reduces Dividend—S. O. of N. J. Fixes Price for Employees—Stock Exchange Listings for 1931

Chilean government replying to questionnaire from Senate Finance Committee, made public Jan. 22 at the Chilean Embassy, officially denied that favors given to Cosach, organized partly with the aid of National City and Guggenheim interests, had contributed to suspensions of payments on its foreign obligations.

Sen. Johnson Inquires

Senate Finance Committee, at request of Senator Johnson, inquired through State Department in a questionnaire containing seven inquiries whether Chile's obligations to Cosach had aided in bringing about this condition.

In reply Chilean government stated that Cosach, organized on March 20, 1931, came into being with obligations totaling $265,596,601.48, including outstanding bonds of companies merged into it, bonds issued by Cosach itself and other obligations.

National City and European bankers subscribed for the Cosach stock, while Guggenheim & Co. received bonds worth $28,790,850.

Some of the questions and their answers were as follows:

"Did the nitrate combine known as Cosach come into being with standing liabilities of £60,000,000 sterling and who were the creditors of such debt ?"

Answer—Cosach was organized March 20, 1931, with the following liabilities indicated in the first prospectus: Outstanding bonds issued by the companies merged into Cosach, $77,205,183.49; issues of the company (Cosach), $112,487,500; other term obligations, $11,047,972.10; demand obligations contracted in the ordinary course of current business, $58,855,935.90. Total, $265,596,601.48. The shares of the company were subscribed for by the National City Company, and by European bankers, specially for the amount of the quotas which have to be delivered to the government for payments due to it in the years 1930-31 and for the expenses of organization. Guggenheim & Co. received bonds totaling $28,790,850 for advances to the Anglo-Chilean Consolidated Nitrate Corporation, now a subsidiary of Cosach. The other bonds were delivered to the government for payments due in the years 1932-33; and to various companies for their contributions of agency rights and credits due.

"If such liabilities existed, how have they been paid, whether by bond issue, loans or other means, and who were the individuals or institutions which collected the said £260,000,000 ?"

Answer—The $265,596,601 of obligations were paid by guaranteeing bonds issued by participating companies and through the issuance of bonds by Cosach.

Foreign Debts

"Does the Chilean Government feel that the turning over to the Cosach of the public nitrate-bearing lands in any way jeopardizes or impairs its capacity to pay the holders of bonds of its foreign debt ?"

Answer—The government of Chile obligated itself to turn over to Cosach nitrate fields which the company might select over a period of sixty years, to the extent of 150,000,000 tons of nitrate content, Cosach also being entitled to purchase the remainder of the public nitrate fields. Up to the present moment no fields have been turned over to Cosach, and the obligations of the Chilean Government have had no practical effect on its capacity to pay the bondholders of its foreign obligations.

"What have been the consequences of the cessions made by the Chilean Government to the Cosach combine of the export tax on nitrate, and certain import taxes, and what, if any, is the existing relation between the scarcity of foreign currency and the said cession, and the suspension by Chile of payment on her external obligations ?"

Answer—The elimination of the export duty on nitrate has not affected the supply of bank drafts nor the suspension by Chile of payments on its foreign debt. Cosach furnishes the market with such drafts as it finds necessary to sell in order to maintain operations and pay its employes and workers in Chile.

Details

"After the Chilean Government renounced its right to collect the export duty on nitrate in favor of the Cosach combine, was the said tax partially or at all restored and, if so, was the restoration for the benefit of the National Treasury of Chile or in favor of certain creditors of Cosach ? If the latter, who are those creditors thus benefited, and in what amounts ?"

Answer—The export duty on nitrate has been abolished in so far as Cosach is concerned, but remains in force with respect to independent companies. These independent companies concerned are very small and only three of them have been in operation, with the production close to 8,000 tons per month. The query probably intends to bring out whether the payment of the duty of 60 Chilean pesos per ton of nitrate exported is for the benefit of the Chilean Treasury or for that of the creditors of the company. It is made in favor of the latter, who are the holders of the bonds mentioned in No. 3.

Who Benefited ?

"Were large sums paid in connection with the organization of Cosach and, if so, who were the Chilean and foreign representatives or organizers who received such sums and in what amounts ?"

Answer—The organization expenses of the company, according to the report of the investigating commission, amounted in Chilean money to 57,709,523 pesos and are divided into three categories: First, expenses incurred by the participating companies and reimbursed by Cosach, 11,254,680 Chilean pesos. Second, indemnization to representatives of participating companies, 22,000,000 Chilean pesos. Third, direct expenses of Cosach,

Price Trend of Chemical Company Stocks

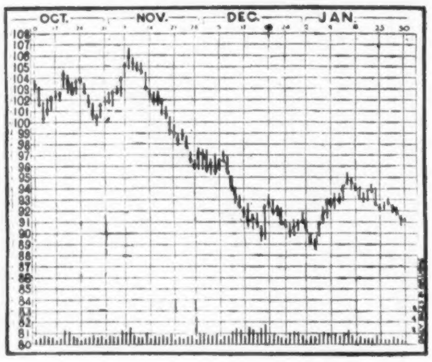
Name	*Jan. 1*	*Jan. 8*	*Jan. 15*	*Jan. 22*	*Jan. 29*	*Net Change*
Allied Chem	68⅝	71⅜	73½	69	67	—1⅝
Air Reduction	49½*	49	53	50	47¾	—1¾
Anaconda	9⅞	11½	11¾	10⅛	10¼	+ ⅜
Col. Carbon	34	35¾	37¼	33¾	32¾	—1¼
Com. Sol.	8⅝	9¼	9⅛	8⅛	7½	—1⅛
Du Pont	55½	54½	56¼	52	49¾	—5¾
Mathieson	14¾	15¼	15¼	14½	14⅞	+ ⅛
Monsanto	21½	22	22¼	22	22	+ ½
Standard N. J.	27⅞	29⅛	29⅜	27⅝	25½	—2⅜
Texas Gulf	22¾	23⅞	25⅛	23½	23¼	+ ½
U. S. I.	26⅛	26⅜	29	25¼	23¼	—2⅞

24,454,843 Chilean pesos. In this last are included the fees of New York counsel, Messrs. Root, Clark and Buckner, 7,320,387 Chilean pesos; and of London, Messrs. Sherman and Sterling, 1,416,229 Chilean pesos. Chilean lawyers were paid 805,000 Chilean pesos. Reimbursement to the State for expenditures on account of traveling expenses and fees of officials, 1,654,184 Chilean pesos.

Stocks Lower

Efforts to arrest last month the downward trend in stock prices, following the making of a new bear-market low Jan. 5, were unsuccessful, and an increase in values that appeared in the first half of the period was erased by a decline which held until the end of the month.

Stock Market Trend



—Herald Tribune

However, the net change one way or another for the month was very small as a glance at the accompanying figures will show. The market was required to withstand a great deal of extremely gloomy news and it is surprising that it digested it with as little upset as it did. The foreign situation proved to be particularly disturbing and the delay in the railroad wage negotiation in Chicago prevented any bullish sentiment from getting started.

Third Month

Values of 240 issues as recorded by the N. Y. Times, which compose twenty of the principal groups listed on the N. Y. Stock Exchange depreciated $257,297,187, making the third consecutive month of losses, $2,447,200,000 being wiped out in December, and $1,784,140,000 in November. The loss last month was equivalent, however, to only 2.33%, following a decline of 18% and 15% in December and November, respectively.

"Sun" Figures

A somewhat similar list compiled by the N. Y. Evening Sun showed a decline of 3% in January compares with a drop of 14% in December and 10% in November. Compared with the valuation at the end of January, 1931, the 225 stocks have declined 64%.

Net Decline

It is surprising to note how comparatively close the per cent of decline in each group reported by the "Times" has been in the period between September, 1929 to December 31, 1931.

	P. C.
Amusements	86
Building equipment	82
Business equipment	89
Chain stores	66
Chemicals	77
Coppers	89
Department stores	81
Foods	71
Leathers	90
Mail order	87
Motors	71
Motor equipment	79
Oils	78
Public utility	76
Railroads	82
Railroad equipment	88
Rubber	82
Steels	89
Sugars	77
Tobaccos	41

Group Changes

Group changes in values for January compared with a year ago, follow:

	1932	*1931*
Amusements	+$16,054,565	+$58,751,619
Building	+ 695,795	+ 34,460,216
Business equip	— 3,522,325	+ 20,968,052
Chain stores	+ 13,307,980	+ 43,148,239
Chemicals	— 76,262,096	— 29,125,079
Coppers	+ 810,166	— 27,131,431
Dept. stores	— 3,999,362	+ 4,855,644
Foods	— 19,702,136	+ 87,721,119
Leathers	+ 303,919	+ 839,422
Mail order	— 1,749,980	+ 45,741,378
Motors	—102,661,894	+143,892,043
Motor equip	— 1,294,779	+ 2,420,328
Oils	— 98,132,904	+140,639,494
Public utilities	—170,107,900	+429,535,579
Railroads	+158,441,880	+510,828,372
Railroad equip	+ 19,538,564	+ 25,022,790
Rubber	— 4,402,719	— 5,585,337
Steels	— 26,576,174	+ 13,277,747
Sugars	— 9,269,587	+ 8,548,884
Tobaccos	+ 51,231,800	+ 65,041,059

Average Price

CHEMICAL MARKETS Average Price of 15 representative industrial chemical and allied industry stocks declined to a new low level as the month closed. The Price for the four Fridays of the month was, Jan. 1, $27.21; Jan. 8, $27.89; Jan. 15, $29.14; Jan. 22, $27.13; Jan. 29, $25.95. The previous low figures was reached in the third week of December, 1931 when the Price stood at $26.56. Stocks included in the price are Air Reduction, Allied, Davidson Chemical, Anaconda, Columbian Carbon, Commercial Solvents, Corn Products, Devoe & Reynolds, du Pont, Liquid Carbonic, Standard of N. J., U. S. I., Texas Gulf Sulphur, Union Carbide, and Cyanamid.

Market Deflated?

A measure of the sweeping readjustment that has taken place over the last 24 months is afforded in the fact that around January lows slightly more than half the stocks listed on the Stock Exchange were selling below $10 a share, according to the Wall St. Journal. Approximately 30% were available under $5 a share.

In contrast to the latter situation, only 2.6% of listed shares were selling under $5 a share in September, 1929. In the latter month, 29% of the stocks on the big board were selling above $100 a share, while a recent compilation shows that the stocks remaining in this category had dwindled to 2.5%.

Chemical Stocks

The chemical group followed very closely the general trend of the market. The actual declines occuring in several of the leading companies were as follows:

Allied Chem. & Dye	....	$4,202,254
Com'l Solvents Corp.	....	3,162,735
Davison Chemical Co.	....	....
Du Pont de Nemours & Co	....	55,328,340
Mathieson Alkali Wks.	$81,304	....
Texas Gulf Sulphur	1,270,200	....
Union Carbide & Carbon	....	13,832,103
U. S. Indust. Alcohol	....	1,028,071
Virginia-Carolina Chem	....	60,097
Total	$1,351,504	[$77,613,600

1931 Earnings

So very few annual statements had been issued as the first month of the new year closed that no comprehensive comparison of earnings was possible. DuPont report showed up well, as did that of Westvaco Chlorine. Hercules Powder and Atlas Powder, however, showed large declines in earning power in 1931 when compared with the previous year. Earnings on common shares of these four companies follow:

	1931	*1930*
Atlas Powder	$0.59	$2.67
Du Pont	4.29	4.67
Hercules Powder	1.04	2.61
Westvaco Chlorine	1.79	2.51

Dividend Reduced

Freeport Texas directors, Jan. 22 declared quarterly dividend of 50c per share on common stock, no par value, payable Mar. 1 to holders of record Feb. 15. Stock previously was on an annual dividend basis of $3 per share, the last quarterly distribution at this rate having been made on Dec. 1, 1931.

President Eugene L. Norton stated that preliminary net income for year ended Dec. 31, 1931, was $2,376,782 after charges and Federal taxes, equal to $3.26 a share on 729,844 no par shares of common stock. This compares with $3,124,185, or $4.28 a share in 1930.

Reduced Tonnages

"In view of the curtailed industrial activity which prevailed during 1931," said Mr. Norton, "resulting in a 27% decline in our sales of sulfur, the directors feel that these earnings give basis for confidence in the strength and earning power of the company, even during years of general business depression."

Business of Research

Dr. C. F. Burgess, Perkin Medalist (rotogravure section) stressed the importance of the link between the financial and the scientific phases of chemical industry in his address of acceptance.

"The scientist has a great opportunity if he will bring himself to share in the affairs of business, and the business man could forget his troubles if he would but experience some of the joys which come through research," asserted Dr. Burgess, whose theme was "Research, for Pleasure or for Gold." "In a partnership of the two lies opportunity for betterment."

Said Dr. Burgess, "When a man with the prospectus of a new device or product or process presents himself I have a mixed feeling of interest and of resistance, for I have to tell him that to put it through the laboratory course it may involve a cost of $1,000, perhaps $100,000. Our average for all projects has been $7,000.

"I must tell him that no matter how practical the idea he presents may seem to him or to us there is but one chance in five that it will pass successfully through the laboratory stages; furthermore, that the investigation, if it survives the full course, may take anywhere from a year to fifteen years with the probability of seven as an average.

Ample Funds

"For thirty-seven years I have been engaged in various forms of scientific research; in that designated as pure science where the results are given to the public, in that sponsored by the Government where the results are forced upon the public, and in industrial research where the results are sold to the public.

"Out of this experience I am able to say that the greatest pleasure to be derived from research is that which comes to the worker when freed from all thoughts of cost or of the economic value of the results."

Standard Oil New Jersey directors fixed $30.50 a share as price for which employes may subscribe for company's capital stock. Price applies to first six months of company's fourth stock acquisition plan, which went into effect on Jan. 1. New price is the lowest at which the company has offered stock to its employes.

Foreign Markets

London	Dec. 31	Jan. 30	Net Change
British Celanese..	9s 9d	9s 9 d	
Celanese Corp....	£1	£1⅛	+⅛
Courtaulds......	£1¾	£1⅝	—⅛
Distillers.........	43s 3d	43s 3d	
Imperial Chem...	14s 1½d	15s 1½d	⅞1s
Un. Molasses....	3s 4½d	8s 7½d	5s 3d
Paris			
Kuhlmann.......	297frs	405 frs.	+108 frs.
L'Air Liquide....	520	725	+205 frs.
Tubize Art Silk pf	111	152	+ 41 frs.
Milan			
Montecatini.....		121¼ lire	
Snia Viscosa.....		103½	
Italgas..........		24½	

Dividends and Dates

Name	*Div.*	*When Payable*	*Books Close*
Allied C & D com...	$1.50	Feb. 1	Jan. 11
Atlas Powder, pref..	1½	Feb. 1	Jan. 20
Cabot (Godfrey L.) Inc..............	$15.00	Jan. 30	Jan. 15
Carman & Co......	.50	Mar. 1	Feb. 15
Columbian Carbon..	.75	Feb. 1	Jan. 15
Consol. Chem. Ind..	.37½	Feb. 1	Jan. 15
Distillers Co., Ltd..	(n)	Feb. 6	Jan. 11
Dow Chem., com...	.50	Feb. 15	Feb. 1
Pref.............	1¾	Feb. 15	Feb. 1
Du Pont (E. I.).....	1½	Jan. 25	Jan. 9
Freeport Texas Co..	.50	Mar. 1	Feb. 15
Liquid Carbonic com	.50	Feb. 1	Jan. 20
National Carbon pref	2	Feb. 1	Jan. 20
National Dist. Prod. com............	.50	Feb. 1	Jan. 15
National Lead pref B	.01½	Feb. 1	Jan. 15
New Jersey Zinc....	.50	Feb. 10	Jan. 20
Smith Agricultural Chem., com......	.12½	Feb. 1	Jan. 21
Pref.............	1½	Feb. 1	Jan. 21

(n) Distillers Co. div. is 1 shilling 6 pence per share.

Dividend Action

Columbian Carbon directors, Jan. 5 declared quarterly dividend of 75c. per share, payable Feb. 1 to holders of record Jan. 15. This places capital stock, represented by voting trust certificates, on a $3 annual basis, and compares with a quarterly payment of $1 per share made on Nov. 2 last.

From Feb. 1, 1930 to and including Aug. 1, 1931 company made quarterly distributions of $1.25 per share, and in addition paid an extra dividend each quarter from Feb. 1 1930 to and including Feb. 2, 1931.

American Smelting and Refining declared dividend of 12½ cents a share, comparing with 37½ cents paid three months ago. This places stock on a 50-cent annual basis, against a previous rate of $1.50. Regular dividends on preferred and special preferred stocks were voted.

Blaw-Knox Profits

Blaw-Knox cut its expenses $1,000,000 a year, states President A. C. Lehman. Plant operations declined to between 35% and 40% of capacity but company still is working at a profit.

Over the Counter Prices*

	Dec. 31, 1931 Bid	Dec. 31, 1931 Asked	Jan. 30, 1932 Bid	Jan. 30, 1932 Asked
J. T. Baker Chem....	9	13	9	13
Dixon Crucible......	60	70	56	64
Merck pfd..........	52	58	54	59
Petroleum Derivatives	3	6	52	55
Solid Carbonic, Ltd...	3¼	4¾	3	4¾
Tubize B.............	37	42		
Worcester Salt.......	83	88	83	87
Young, J. S. Co., com.	80	89	87	
Young, J. S. Co., pfd..	99		89	

*Close Jan. 30.

Solid Carbonic Directors

E. H. de Bronkart, Fenner, Beane & Ungerleider elected director of Solid Carbonic to fill the vacancy created by recent death of John Collingwood, Harvey, Fisk & Co.

G. M. Myers elected director, Celotex replacing W. S. Gray, Jr., resigned. C. G. Rhodes, treasurer, elected to the additional post of secretary, replacing E. B. Roberts, who is assuming other duties with the company.

Westvaco Chlorine Products appointed the Commercial National Bank & Trust Co. transfer agent for the preferred stock.

John J. Watson, International Agricultural president told stockholders that bank loans, now at year's peak, are $2,300,000, or about $300,000 less than year ago. Current year holds little promise for profits, due to curtailed farm buying power. Fertilizer companies are preparing for a reduction in sales of about 50 per cent from normal. Inventories, however, are the lowest in the history of the industry and price structure is firm. Directors were reelected.

1931 Listings

Aggregate of new and additional domestic and foreign corporate securities listed on N. Y. Stock Exchange during calendar year 1931 (apart from government and municipal issues) was $2,703,030,179, and compares with $7,632,633,397 in 1930 and $9,151,523,107 in 1929, which last was the biggest on record for any 12 months' period in the history of the Exchange.

Listings of chemical and allied industries in 1931 were as follows:

INDUSTRIAL STOCKS LISTED FIRST SIX MONTHS OF 1931

Company and Class of Stock—	*Amount*	*Purpose of Issue*
Air Reduc Co Inc com (10,853 shs)......................	$271,325	Acquis constit companies
Allied Chemical & Dye Corp.—Common (114,349 shs)...	*571,745	Stock dividend
American Agricul Chem Co Del—Common (288,752 shs).	*5,775,040	Issued per plan of Conn Co
Anaconda Copper Mining Co stock..................	2,230,750	Acquire stock of constit cos
Atlantic Refining Co stock.........................	113,325	Corporate purposes
Atlas Powder Co pref.............................	229,100	Acquisition
Colgate-Palmolive-Peet Co pref....................	8,437,200	Acquis and corp purposes
Columbian Carbon Co—Common (40,000 shares).......	*1,680,000	Acquis of constituent cos
Foster-Wheeler Corp. com. (7,500 shs)...............	*557,410	Acquis of constit co.
Monsanto Chemical Works—Common (6,341 shs).......	*105,683	Stock dividend
U. S. Gypsum Co com..............................	25,036,420	Old stocks just listed
7% preferred.....................................	8,727,700	

INDUSTRIAL STOCKS LISTED SECOND SIX MONTHS OF 1931

Company and Class of Stock—	*Amount*	*Purpose of Issue*
American Agri. Chemical Co. (Del) com (9,361 shares) ..	*187,220	Issued per plan of conn co
(E. I.) du Pont de Nemours & Co—6% preferred......	10,350,000	Acquisition.
Monsanto Chemical Works—Common (21,450 shs).....	*357,500	Corporate purposes
Newport Industries Inc cap stock..................	519,347	Acquis of constit co
Procter & Gamble Co 5% pref......................	4,656,900	Exchange for pref stock
Socony-Vacuum Corp capital stock..................	794,016,075	Exchange for stocks of Associated companies
Westvaco Chlorine Products Corp Common (59,807 shs)	*1,046,622	Corporate, etc. purposes

*Includes shares of no par value. The amounts given represent the declared or stated value.

Earnings at a Glance

Company	Annual Dividends	Net Income 1931	Net Income 1930	Common Share Earnings 1931	Common Share Earnings 1930
Archer-Daniels-Midland:					
Dec 31, quarter....	ee...	$225,013	*......	$.30	....
6 mos., Dec. 31.....	ee...	44,873	*......	.59	....
Atlas Powder:					
Year, Dec. 31......	$4.00	$746,454	$1,246,432	$.59	$2.67
Atlantic Refining:					
vYear, Dec. 31.....	$1.00	$514,000	$2,742,000	$.19	$1.01
Com'l Solv. Corp.:					
Year, Dec. 31......	1.00	2,118,318	2,717,000	h.83	h1.07
du Pont de Nemours:					
Year, Dec. 31......	4.00	53,190,060	55,962,009	j4.29	j4.67
Hercules Powder:					
Year, Dec. 31......	3.00	1,430,538	2,376,479	h1.04	h2.61
Standard Oil of Kansas:					
Year, Dec. 31......	f....	†618,616	380,148	....	1.19
U. S. Smelting, Refining & Mining:					
11 mos., Nov. 30...	1.00	2,122,108	3,377,751	j1.01	j2.93
Westvaco Chlorine:					
hhDec. quarter.....	1.60	154,002	142,479	h.40	h.46
hhYear............	1.60	665,006	720,145	h1.79	h2.51

*Not available. †Net loss. cOn combined Class A and Class B shares. fNo common dividend. hOn shares outstanding at close of respective periods. jOn average shares. pOn preferred stock. vPreliminary statement. eeLast declaration was designated as a dividend of 25 cents a share. hhPeriod ended January 2, 1932, comparing with period ended December 27, 1930.

Company Reports

Du Pont shows earnings for 1931 applicable to common stock were $47,216,932 or $4.29 a share on 11,008,512 shares, average outstanding, which compares with $50,379,490 or $4.67 a share for 1930 on 10,783,555 shares, average outstanding. Figures for both years include du Pont Co.'s equity in undivided profits or losses of controlled companies not consolidated. The figures for 1930 include an extra dividend from the company's General Motors investment amounting to $0.28 a share.

Lammot du Pont
"We are passing through no ordinary depression"

Income from operations for 1931 was $21,109,352, and in 1930 it was $21,745,508. Income from investments for 1931 was $34,377,602, and in 1930 it was $36,653,511, including $2,993,600 extra dividend received from General Motors investment. The net income for 1931, after making provision for Federal income taxes and interest on bonds of subsidiary companies, was $53,190,060, which is equal to 8.6 times the debenture stock dividends and was in excess of dividends paid on both debenture and common stocks by $2,925,905. Net income for 1930 was $55,962,009.

Relative to existing business conditions, Lammot du Pont, president, in introducing the report, says:

"We are passing through no ordinary depression. Business in general throughout the United States and in many important foreign countries has been declining since the middle of 1929 until the present rate of activity is farther below the estimated normal than at any previous period for which records are available. However, the rate of decline allowing for seasonal conditions has recently been measurably checked, and there is increasing evidence of approaching stability. Wholesale prices on the average were relatively steady during the last half of 1931. Our central banking system is still as strong as any in the world, and our national gold reserves are very ample.

"Although the going has been hard, more real advance has probably been made during the past two years of adversity than during the immediately preceding years of comparatively easy progress. Yet we must all continue to be more industrious. Both public and private budgets must be balanced. Errors in judgment are largely responsible for creating present economic difficulties, and only by our own efforts can we overcome our past errors.

"As soon as confidence returns, and the time should not be far away, the wheels of industry and trade will begin to turn more rapidly, and the stimulus of our wants, combined with the energy and capacity of the American people, will gradually bring back a sounder prosperity based on a recognition of real values and an abandonment of unsound speculative dreams."

Company's total current assets are $121,928,312 and total current liabilities are $11,472,340, making a ratio of current assets to current liabilities of 10.6. Debenture stock outstanding increased by 103,500 shares issued in payment for the properties and business purchased from Newport.

Surplus at the end of the year was $198,933,044 after the following adjustments: A credit of $1,759,495, resulting from acquisition of properties and business of Newport, represents the value of net assets acquired (exclusive of Goodwill) in excess of par value of debenture stock issued for those assets.

A debit of $5,354,104, to adjust book value of ammonia, dyestuffs and other patents and processes to a nominal amount as a matter of policy. A debit of $8,484,037 resulting from adjustment in the book value of the General Motors investment to $17.90 a share, which closely corresponded to its net asset value as shown by the balance sheet of General Motors Corp., at Dec. 31, 1930. The previous valuation was $18.75 a share.

Total assets are $620,540,020, including $178,663,838, representing 9,981,220 shares of General Motors common stock carried at $17.90 a share; miscellaneous securities, $39,995,837, including 127,952 shares of the company's common stock at cost, $8,105,050; and plants and properties, $246,306,177.

Current assets include cash amounting to $20,761,887 and marketable securities of $47,960,629, consisting of $23,035,000 par value United States 4th Liberty Loan 4½'s, $969,000 par value other U. S. Government Bonds, $15,004,028 face value High Grade Short Term Notes and Prime Bankers Acceptances maturing within four months, and other readily marketable securities. The quoted market value on all of these securities on Dec. 31, 1931, was $46,753,958.94.

During the year there was a marked increase of 7,822 or 22.6% in the number of holders of the company's common stock, bringing the total to 42,465 as against 34,643 at the end of 1930.

Income Account

	1931	1930
Income from Operations before Provision for Depreciation and Obsolescence..........	$33,608,367.61	$33,811,682.86
Less—Provision for Depreciation and Obsolescence of Plants and Equipment	12,499,015.48	12,066,175.24
Net Income from Operations..............	$21,109,352.13	$21,745,507.62
Income received from Investment in General Motors Corporation..................	29,942,929.62	(a)32,936,529.54
Income from Miscellaneous and Marketable Securities, etc........................	4,434,672.63	3,716,981.61
Total Income......................	$55,486,954.38	$58,399,018.77
Provision for Federal Income Tax.........	2,224,511.21	2,364,359.61
Net Income before Interest on Bonds..	$53,262,443.17	$56,034,659.16
Interest on Bonds of Subsidiary Companies.	72,383.33	72,649.59
Net Income......................	$53,190,059.84	$55,962,009.57
Dividends on Debenture Stock...........	6,189,873.82	5,971,980.00
Consolidated Earnings Applicable to Common Stock..................	$47,000,186.02	$49,990,029.57
Including E. I. du Pont de Nemours & Company's equity in undivided profits or losses of controlled companies not consolidated, amount earned on common stock is......	$47,216,932.38	$50,379,490.05
Average number of shares of $20.00 par value common stock outstanding during the year	11,008,512	10,783,555
Amount earned a share................	$4.29	$4.67

Duval Texas Sulphur Co. reports for year ended Aug. 31: Net income after taxes and charges, $197,933, equal to 39 cents a share on 500,000 shares of capital stock, compared with $231,541 or 46 cents a share in preceding fiscal year.

Westvaco Earns $1.79 a Share

Westvaco Chlorine and subsidiaries report for year ended January 2, 1932, net profit of $665,006 after interest, depreciation and federal taxes, equivalent after 7% preferred dividends, to $1.79 a share on 284,962 no-par shares of common stock outstanding at end of period. This compares with $720,145 or $2.51 a share on 225,155 common shares in year ended December 27 1930.

Balance sheet as of January 2, 1932, shows current assets of $1,340,882 and current liabilities $136,712 as contrasted with $1,298,526 and $166,119 respectively, on December 27, 1930.

For quarter ended January 2, 1932, net profit was $154,002 after interest, depreciation, federal taxes, etc., equivalent after 7% preferred dividends, to 40 cents a share on 284,962 no-par shares of common stock. This compares with net profit in preceding quarter of $134,321 or 33 cents a share on 284,962 common shares and $142,479 or 46 cents a share on 225,155 common shares in quarter ended December 27, 1930.

Consolidated income account of Westvaco Chlorine and subsidiaries for year ended Jan. 2, 1932, compares as follows:

	Year ended Jan. 2, '32	*Year ended Dec. 27, '30*	*Year ended Dec. 28, '29*	*Year ended Dec. 29, '28*
Sales	$4,016,912	$5,116,795	$5,943,958	$5,215,865
Costs & exp.	2,704,809	3,730,523	4,173,678	3,699,686
Oper. profit	$1,312,103	$1,386,272	$1,770,280	$1,516,179
Other inc	77,806	45,816	117,300	72,481
Total inc.	$1,389,909	$1,432,088	$1,887,580	$1,588,660
Int., etc.	211,182	205,742	222,543	231,591
Depreciation	428,652	414,139	412,734	395,999
Fed taxes	85,069	92,062	125,249	115,352
Net profit	$665,006	$720,145	$1,127,054	$845,718
Pfd divs	153,622	153,622	153,622	126,350
Com. divs	451,717	450,310	396,429	100,000
Surplus	$59,667	$116,213	$577,003	$619,368

Texas Gulf Sulphur earnings in fourth quarter of 1931 will be in the neighborhood of 80 cents a share on the 2,540,000 shares of capital stock outstanding, covering the quarterly dividend payment at the rate of $3 by a fair margin.

In the nine months ended September 30, net profit was $6,704,091, or $2.64 a share, indicating a final net profit for the year of $3.44 a share. This would compare with a net of $13,972,085, or $5.50 a share earned in 1930, and $16,247,478, or $6.39 a share in 1929.

Dow Covers Dividends

Dow Chemical earnings for eight months ended Jan. 31, 1932, after allowing for depreciation and income tax will be more than sufficient to cover annual dividends on both the preferred and common stocks, James T. Pardee, secretary, states. Company's common stock is on a $2 annual basis. The fiscal year ends May 31. For the year ended May 31, 1931, net profit was $2,377,200 after charges and taxes, equal after 7% preferred dividend requirements to $3.44 a share on 630,000 no-par common shares.

Solvent's Net $2,118,318

Commercial Solvents for year ended Dec. 31, 1931, shows consolidated net profit of $2,118,318 after depreciation, federal taxes, inventory adjustments, etc., equivalent to 83 cents a share on 2,530,126 no-par shares of capital stock. This compares with $2,717,000 or $1.07 a share on 2,529,725 shares in 1930.

Current assets as of Dec. 31, 1931, including $4,804,303 cash, U. S. Government and other marketable securities, but excluding company's common stock held as an investment, were $6,694,006 and current liabilities were $375,567. This compares with current assets on Dec. 31, 1930, including $4,838,218 cash, of $8,442,631 and current liabilities of $806,428.

Consolidated income account for year 1931, compares as follows:

	‡1931	*1930*	*1929*	*1928*
*Oper profit	$2,074,042	$2,918,245	$4,407,922	$3,555,353
Other income	317,517	231,100	383,136	153,816
Total inc	$2,391,559	$3,149,345	$4,791,058	$3,709,169
Charges	113,466	96,445	233,154	308,440
Fed. taxes, inv adj, etc.	159,775	335,900	890,502	471,309
Net profit	$2,118,318	$2,717,000	$3,667,402	$2,929,420
Dividends	2,530,001	2,481,947	1,957,855	1,837,667
Deficit	$411,683	†$235,053	†$1,709,547	†$1,091,753

*After depreciation. †Surplus. ‡Includes seven months' profits of Commercial Pigments Corp. and American Ilmenite Corp. and five months' income from Krebs Pigment and Color Corp.

Hercules Powder reports for year ended Dec. 31, 1931, net income of $1,430,538 after depreciation, federal taxes, etc., equivalent after 7% preferred dividends, to $1.04 a share on 606,234 no-par shares of common stock. This compares with $2,376,479, or $2.61 a share, on 603,079 common shares in 1930.

Statement for year 1931 compares as follows:

	1931	*1930*	*1929*	*1928*
Gross rec	$20,450,440	$25,906,179	$32,976,418	$30,559,876
*Profit	1,474,092	2,577,003	4,918,949	4,608,468
Fed taxes	43,554	200,524	560,045	569,488
Net income	$1,430,538	$2,376,479	$4,358,904	$4,038,980
Pfd divs	799,687	799,687	799,687	799,687
Com divs	1,816,335	1,805,428	2,392,000	2,058,000
Deficit	$1,185,484	$228,636	†$1,167,217	†$1,181,293

*After depreciation, etc. †Surplus.

Monsanto Earnings Rise

Monsanto Chemical officials estimate earnings will be slightly short of $3 a share on the 429,000 shares of capital stock outstanding, which pays $1.25 annually in dividends. This would compare with $1.73 a share on 422,600 shares outstanding in 1930.

The good showing in the face of the downward adjustment in prices of nearly all important chemicals, and generally adverse business conditions which prevailed during 1931, is explained by the fact that the third and fourth quarters of 1930 were unusually poor, due to the large non-recurring losses and write-offs, while in the year just ended the company benefited from investment of approximately $5,000,000 during the past three years in plant consolidations and additions.

Annual Reports Show that——

Tabulation shows number of times interest charges and preferred dividend requirements have been earned in 1931 by together with important balance sheet items, as abstracted from annual reports:

	Interest times earned	*Pfd. div. times earned*	*Cash and mark securities*	*Inventories*	*Ratio cur. assets to cur. liabil.*	*Working capital*
Devoe & Raynolds:						
Year, Nov. 30, 1931	No fd. dbt.	3.27	$1,638,710	$2,712,269	18.9	$6,609,576
Year, Nov. 30, 1930	No fd. dbt.	1.19	1,411,453	3,496,275	16.6	7,621,061
du Pont de Nemours:						
Year, Dec. 31, 1931	d	8.62	b68,722,516	33,564,317	10.6	110,455,973
Year, Dec. 31, 1930	d	9.43	b62,515,913	39,457,080	9.3	110,799,049
Hercules Powder:						
Year, Dec. 31, 1931	No fd. dbt.	2.97	6,836,773	5,112,060	24.2	14,560,404
Year, Dec. 31, 1930	No fd. dbt.	1.79	8,673,655	5,927,289	25.5	17,340,667

d company has no direct funded debt.

The Industry's Stocks

1932 Jan. Last	1932 Jan. High	1932 Jan. Low	1931 High	1931 Low	1930 High	1930 Low	Sales In Jan.	ISSUES	Par $	Shares Listed	An. Rate	Earnings $-per share-$ 1930	Earnings $-per share-$ 1929
								NEW YORK STOCK EXCHANGE					
49¾	▼55¾	46⅜	109⅜	47⅝*	156⅞	87½	52,500	Air Reduction	No	830,000	$3.00	6.32	7.75
66⅞	74⅜	62¼	182¾	64*	343	170¼	435,900	Allied Chem. & Dye	No	2,401,000	6.00	9.77	12.60
115	116	108	133¼	100*	126¼	120¾	1,800	7% cum. pfd.	100	393,000	7.00		76.88
5½	7½	5½	29¾	5⅛*	10⅞	1⅝	2,200	Amer. Agric. Chem.	100	333,000		Yr. Je. '30 Nil	
7	8½	6½	14½	5	33	9	19,200	Amer. Com. Alc.	No	389,000		d1.27	3.22
5⅜	6⅝	5⅜	23¾	4⅞	51½	7	10,000	Amer. Metal Co., Ltd.	No	1,218,000	1.00	1.63	3.23
18½	19½	16	89½	14*	116	80	370	conv. 6% cum. pfd.	100	68,000	6.00		47.53
15⅞	18⅝	12¾	58½	17½*	79½	37½	82,700	Amer. Smelt. & Refin.	No	1,830,000	4.00	3.77	10.02
...	85	73	138½	75*	141	131	1,500	7% cum. pfd.	100	500,000	7.00		43.66
⅜	½	¼	4½	¼*	22½	2	11,800	Amer. Solvents & Chem.	No	503,000		d2.86	2.56
2⅞	3⅜	2⅞	8¾	2½*	17⅞	3⅝	2,100	Amer. Zinc. Lead, & Smelt.	25	200,000		d1.46	0.53
23	23	22	45⅛	19½*	79⅞	26¾	200	6% cum. pfd.	25	80,000			7.32
10¼	12⅜	9	43¼	9¼*	81½	25	217,000	Anaconda Copper Mining	50	8,859,000	2.50	e2.07	8.29
11	11	9½	18	10⅛*	29¼	13½	3,200	Archer Dan. Midland	No	550,000	2.00	Yr. Aug. '30 1.68	
9	10¾	8¾	23⅝	8⅝*	51⅝	16⅝	41,200	Atlantic Refining Co.	25	2,690,000	1.00	1.02	6.20
22¾	22⅞	17½	54	18*	106	42	2,000	Atlas Powder Co.	No	265,000	4.00	2.67	7.66
75	79½	74½	99⅞	77¼*	106	97	560	6% cum. pfd.	100	96,000	6.00		28.25
⅝	¾	⅝	2	¾*	5¼	⅞	4,200	Butte & Sup. Mining	10	290,000			Nil
1⅛	1¼	1	2¾	1*	4¼	1¼	1,400	Butte Copper & Zinc	5	600,000		Nil	0.34
2¾	2⅞	2½	7¼	2¼	15⅞	2	800	Certain-Teed Products	No	400,000		d7.61	Nil
11⅞	11⅞	11⅞	25⅛	8¼*	45⅛	6¾	100	7% cum. pfd.	100	63,000			Nil
28⅛	30¼	26⅛	50½	24*	64⅞	44	7,600	Colgate-Palmolive-Peet	No	2,000,000	2.50	3.76	4.03
32⅛	38½	30	111⅝	32*	199	65⅛	32,200	Columbian Carbon	No	499,000	5.00	5.04	7.84
7⅜	9½	7¼	21½	6⅝*	38	14	98,400	Comm. Solvents	No	2,530,000	1.00	1.07	1.51
40⅝	45⅜	37	86⅝	36¼	111⅝	65	51,800	Corn Products	25	2,530,000	3.00	4.82	5.49
126	129½	126	152¼	116*	151½	140	250	7% cum. pfd.	100	250,000	7.00		62.59
4	5¼	3½	23	3¼*	43⅝	10	8,600	Davison Chem. Co.	No	504,000		Yr. Je. '30 4.00	
10½	10½	10¼	19⅛	8½*	42¾	11½	400	Devoe & Raynolds "A"	No	160,000	1.20	2.24	4.52
...	...	...	109	100	114¾	99		7% cum. 1st pfd.	100	16,000	7.00		67.59
50½	57⅞	47¾	107	50¾*	145¼	80½	655,100	DuPont de Nemours	20	11,014,000	4.00	4.52	6.99
99¼	100	99¼	185¾	91½	123	114½	4,900	6% cum. deb.	100	978,000	6.00		78.54
79½	87⅞	73	185¾	77*	255¼	142⅛	103,600	Eastman Kodak	No	2,261,000	5.00	8.84	9.57
99	116	99	135	103*	134	120⅞	110	6% cum. pfd.	100	62,000	6.00		356.89
17⅛	19½	15¼	43¼	13¼	55½	24⅛	39,000	Freeport Texas Co.	No	730,000	4.00	w4.77	5.60
13½	15½	11	47	9⅝	71⅛	22⅝	14,400	General Asphalt Co.	No	413,000	3.00	2.44	4.71
5	5⅞	4¾	16⅛	4½*	38	7	4,500	Glidden Co.	No	695,000		Yr. Oct. '30 Nil	
43	43	42	80	40*	105⅛	63½	40	7% cum. prior pref.	100	74,000	7.00	Yr. Oct. '30 Nil	
26	26½	25	43¼	13¼	85	50	800	Hercules Powder Co.	No	603,000	3.00	2.61	5.95
95	92	92	119½	95*	123¾	116½	450	7% cum. pfd.	100	114,000	7.00		38.16
29½	31⅛	23⅛	86	21	124	31	12,200	Industrial Rayon	No	200,000	4.00	7.74	7.26
1½	1½	1⅛	5¼	1*	8½	3⅜	800	Intern. Agric.	No	450,000		Yr. Je.'30 1.68	
5⅝	7⅛	4⅝	51¼	4½*	67¼	42¼	1,600	7% cum. prior pfd.	100	100,000	7.00	Yr. Je. '30 14.58	
8⅛	9⅛	7⅛	20⅛	7	44⅝	12¾	224,000	Intern. Nickel	No	14,584,000	1.00	.67	1.47
21	21	19⅜	42	18	45¾	31	5,200	Intern. Salt	No	240,000	3.00		11.32
18¾	24¼	15⅞	80¾	15⅝	148⅝	48¾	223,100	Johns-Manville Corp.	No	750,000	3.00	3.66	8.09
9⅞	10	9⅝	16½	9	25	8¾	600	Kellogg (Spencer)	No	598,000	0.80	h1.14	2.36
16	18	14½	55⅛	13½*	81⅞	39	6,700	Liquid Carbonic Corp.	No	342,000	4.00	Yr. Sep. '30 5.22	
4¼	5⅜	3⅞	17	3⅜	37⅝	10½	7,600	McKesson & Robbins	No	1,073,000	1.00	.96	2.65
105	105	104½	37⅜	16*	49¼	25¾	120	conv. 7% cum. pref.	50	428,180	3.50		9.43
15	15	13⅞	25	13*	39¾	20	400	MacAndrews & Forbes	No	340,000	2.60	2.61	3.13
14⅞	16⅝	13¼	31½	12*	51⅝	30¼	7,000	Mathieson Alkali	No	650,000	2.00	2.96	3.31
115½	118	113	125⅜	106½*	136	115	540	7% cum. pfd.	100	28,000	7.00		93.91
22	23½	20¾	29	16¼	63¾	18⅜	5,400	Monsanto Chem.	No	416,000	1.25	1.71	4.25
18	22	17¼	36⅜	16*	39½	18⅛	6,900	National Dist. Prod.	No	252,000	2.00	1.23	1.42
86	92	86	132	78½	189½	114	1,000	National Lead	100	310,000	5.00	7.58	25.49
115½	118	113	143	111*	144	135	540	7% cum. "A" pfd.	100	244,000	7.00		41.95
101½	105	100	120	102*	120	116	190	6% cum. "B" pfd.	100	103,000	6.00		82.47
26¾	27¾	23	46½	22	55⅝	26⅛	9,000	Penick & Ford	No	425,000	1.00	4.01	3.97
39⅝	42¾	37⅞	71¼	36⅜*	78⅞	52⅝	130,100	Procter & Gamble	No	6,410,000	2.40	Yr. Je. '30 3.36	
4¼	5⅛	3⅞	11⅞	3¼*	27¼	7⅝	17,200	Pure Oil Co.	25	3,038,000		.18	1.52
59	60½	50	101⅞	53½*	114¼	90½	760	8% cum. pfd.	100	130,000	8.00		22.55
16½	16⅝	13⅜	42⅝	12¼*	56½	36⅞	52,500	Royal Dutch, N. Y. shs.		894,000		2.39	3.35
10	10¼	7⅜	30⅜	7*	57¼	19¼	13,200	St. Joseph Lead	10	1,951,000	2.00	2.09	3.82
3⅛	3⅞	2¾	10¼	2½*	25½	5¼	41,500	Shell Union Oil	No	13,071,000		d.56	1.26
22¾	27	22¾	51¾	23⅛*	75	42¼	87,000	Standard Oil, Calif.	No	12,846,000	2.50	2.88	3.63
25½	30½	25⅜	52½	26*	84⅞	43½	278,600	Standard Oil, N. J.	25	25,419,000	1.00	1.65	4.76
9	10⅝	8⅞	26	8⅜*	40⅝	19¾	133,700	Standard Oil, N. Y.*	25	17,809,000	1.60	.92	2.23
2	2⅝	1⅞	9½	2*	17	7¾	5,700	Tenn. Corporation	No	857,000	1.00	1.21	2.19
11⅛	13⅞	11	36¼	9⅞*	60½	28¼	87,100	Texas Corp.	25	9,851,000	3.00	1.53	4.91
23¼	25⅞	20½	55¾	19½*	67⅝	40¼	50,100	Texas Gulf Sulphur	No	2,540,000	4.00	5.50	6.40
29½	34⅜	27⅝	72	27⅛*	106⅝	52½	254,600	Union Carbide & Carb.	No	9,001,000	2.60	3.12	3.94
9¼	12	9⅛	28¾	6⅛	84	14⅝	4,800	United Carbon Co.	No	398,000		1.43	1.94
23⅜	30¾	22⅛	77⅜	20⅜	139⅜	50½	105,900	U. S. Ind. Alc. Co.	No	374,000	6.00	z2.96	12.63
13	16¼	11½	76¾	11*	143¼	44⅝	53,300	Vanadium Corp. of Amer.	No	378,000	3.00	2.95	4.91
⅝	⅞	⅝	3¼	½*	8⅞	1⅝	1,200	Virginia Caro. Chem.	No	487,000		Yr. Je. '30 Nil	
4½	4	4	17	2¾*	34¼	9	200	6% cum. part. pfd.	100	213,000		Yr. Je. '30 2.63	
39	39½	35	72	35*	82⅝	67½	800	7% cum. prior pfd.	100	145,000	7.00	Yr. Je. '30 11.96	
10¾	12	9	40	7⅜*	59½	18	3,100	Westvaco Chlorine Prod.	No		2.00	2.51	4.32

h 11 mos. ending Aug. 30

w 13 mos.

z Before inventory adjustment

* Socony Vacuum

1932 Jan. Last	1932 Jan. High	1932 Jan. Low	1931 High	1931 Low	1930 High	1930 Low	Sales In Jan.	ISSUES	Par $	Shares Listed	An. Rate	Earnings $-per share-$ 1930	Earnings $-per share-$ 1929
								NEW YORK CURB					
6⅞	6⅞	6	8½	5	13	3⅝	400	Acetol Prod. conv. "A"	No	60,000			0.42
2	3	2	19½	1¼*	34	16	5,000	Agfa Ansco Corp.	No	300,000			Nil
50¼	61¾	45½	224	48*	356	140½	35,150	Aluminum Amer.	No	1,473,000		z1.93	11.18
63½	67¾	60½	109⅝	56¾*	111½	104	2,300	6% cum. pfd	100	1,473,000	6.00		17.19
3¼	3⅞	2⅞	12¾	2⅝*	37	6⅝	21,500	Amer. Cyanamid "B'	No	2,404,000			4.15
½	⅝	⅜	15	¼*	43⅝	7½	2,400	Anglo-Chilean Nitrate	No	1,757,000		Yr. Je. '30 Nil	
1	1	1	4	½	6½	½	200	Assoc. Rayon Corp.	No	1,200,000		Yr. Je. '30 1.87	
...	...	...	60	32¼	60⅝	31¼		conv. 6% cum. pfd.	100	200,000	6.00		

*New low for year

1932 Jan. Last	High	Low	1931 High	Low	1930 High	Low	Sales in Jan.	ISSUES	Par $	Shares Listed	An. Rate	Earnings $-per share-$ 1930	1929
1⅝	1⅝	1⅝	2⅜	⅞	5¼	1⅝	400	Brit. Celanese Am. Rcts	2.43	2,806,000			0.03
...	24¾	20	81¼	16½*	90	48	1,200	Celanese 7% cum. part. 1st pfd	100	148,000	7.00		14.50
20	42	22	65	25	90	70	1,400	" 7% cum. prior pfd	100	115,000	7.00		25.70
20	25	20	...	...	20	3½	250	Celluloid Corp	No	195,000			1.76
5⅞	5⅞	5⅞	9	5¾*	13¼	8⅜	100	Courtaulds, Ltd	1£				0.34
...	31	29	51	30¼*	100	49	300	Dow Chemical	No	630,000	2.00	3.44	4.08
28½	31⅞	25⅜	75½	25⅜*	166⅞	58½	23,100	Gulf Oil	25	4,525,000	1.50		9.83
6½	6½	6½	13	6¼*	23	10½	100	Heyden Chemical Corp	10	150,000			3.08
...	...	...	3⅛	2⅜*	7	4		Imperial Chem. Ind	1£				0.49
...	...	...	...	...	16	3½		Monroe Chem	No	126,000			2.54
...	...	...	60	20	79½	45		Shawinigan W. & P	No	2,178,000	2.50		2.35
34	34½	32½	66⅛	34¼*	85	58	350	Sherwin-Williams Co	25	636,000	4.00	Yr. Aug. '30 4.14	
1⅛	1¼	1	12	⅝*	34½	3⅝	2,100	Silica Gel Corp	No	600,000			
15	16⅞	14	38½	13½*	59⅞	30	92,400	Standard Oil Ind	25	16,851,000	2.50	2.73	4.66
18	18⅞	17¾	30⅜	14⅛*	34½	27	18,500	Swift & Co	25	6,000,000	2.00	2.08	2.18
2½	2⅞	2	16	1½*	22¾	3	3,900	Tubize "B"	No	600,000	10.00		
								United Chemicals					
...	13⅛	13	...	...	44	14	200	$3 cum. part. pfd.	No	115,000	3.00		7.66
								CLEVELAND					
...	...	...	...	...	96	91½		Cleve-Cliffs Iron ,$5 pfd	No	498,000	5.00	11.42	
30	29⅛	51½	51½	30*	100	48	920	Dow Chemical Co	No	630,000	2.00	3.44	4.08
34	35	33	68½	33⅞*	85	57½	2,000	Sherwin-Williams Co	25	636,000	4.00	Yr. Aug. '30 4.14	
								CHICAGO					
30⅝	31¾	27	39⅞	26½*	46¾	33½	550	Abbott Labs	No	145,000	2.50	3.32	4.92
...	...	...	5½	3	15	3⅛		Monroe Chem	No	126,000		1.09	2.54
...	32	27	33	24	35	15¼	350	$3.50 cum. pref	No	30,000	3.50		13.35
18½	18⅞	18	30½	16½*	33¼	27	14,600	Swift & Co	25	6,000,000	2.00	2.08	2.18
								CINCINNATI					
39⅛	42¾	38	71	36⅞*	110	53⅛	6,500	Procter & Gamble	No	6,410,000	2.40	Yr. Je. '30 3.36	
								PHILADELPHIA					
35	35	35	75	37¼*	100	89	100	Pennsylvania Salt	50	150,000	5.00	Yr. Je. '30 7.97	

The Industry's Bonds

1932 Jan. Last	High	Low	1931 High	Low	1930 High	Low	Sales in Jan.	ISSUE	Date Due	Int. %	Int. Period	Outstanding $
								NEW YORK STOCK EXCHANGE				
73	75	69	99	69¼*	100½	93	13	Amer. Cyan. deb. 5s	1942	5	A. O.	4,554,000
68⅜	70	55	102	52*	177	94¾	302	Amer. I. G. Chem. conv. 5½s.	1949	5½	M. N.	29,933,000
94	96	90	104½	85¾*	104	101	261	Am. Smelt & Ref. 1st. 5s. "A"	1947	5	A. O.	36,578,000
10	10	7	63½	7½*	98½	67	101	Anglo-Chilean s. f. deb. 7s	1945	7	M. N.	14,600,000
90	93	85⅛	103	89*	103	100	60	Atlantic Refin. deb. 5s	1937	5	J. J.	14,000,000
60	60	60	104	59*	105½	100¼	3	Interlake Iron Corp. 1st 5½s "A"	1945	5½	M. N.	6,629,000
...	102½	100⅝	105⅜	100	104½	97½	12	Corn Prod. Refin. 1st s. f. 5s	1934	5	M. N.	1,822,000
12	13¾	10	75½	6	87½	38	358	Lautaro Nitrate conv. 6s	1954	6	J. J.	32,000,000
...	72⅜	69	96	67¾*	100½	87	89	Pure Oil s. f. 5½% notes	1937	5½	F. A.	17,500,000
87⅞	89	80	103	80*	104	93¾	155	Solvay Am. Invest. 5% notes	1942	5	M. S.	15,000,000
100⅛	101¼	99½	105½	98¼*	104¾	100	1,014	Standard Oil, N. J. deb. 5s	1946	5	F. A.	120,000,000
89⅜	92	87	106½	85*	104⅛	96½	213	Standard Oil, N. Y. deb. 4½s	1951	4½	J. D.	50,000,000
...	63	50	99	45*	102½	90¼	11	Tenn. Corporation deb. 6s. "B"	1944	6	M. S.	3,308,000
								NEW YORK CURB				
93¼	98⅞	91	105½	93⅛*	104⅞	100⅛	422,000	Aluminum Co., s. f. deb. 5s	1952	5	M. S.	37,115,000
...	71¼	65	104¾	66*	104¼	96⅝	51,000	Aluminum Ltd., 5s	1948	5	J. J.	20,000,000
15	15	15	56	10	60	51	10,000	Amer. Solv. & Chem. 6½s	1936	6½	M. S.	1,737,000
...	...	...	43	29	80	51		General Rayon 6s. "A"	1948	6	J. D.	5,085,000
93	95	92½	103⅛	40½	104	90¼	230,000	Gulf Oil, 5s	1937	5	J. D.	30,414,000
93	95½	92½	104	74*	104	99	172,000	Sinking Fund deb. 5s	1947	5	F. A.	35,000,000
71¼	74⅝	64	102⅞	66*	103½	95¾	234,000	Koppers G. & C. deb, 5s	1947	5	J. D.	23,050,000
73¼	74½	67½	98⅜	56*	98¾	90⅜	239,000	Shawinigan W. & P. 4½s. "A"	1967	4½	A. O.	35,000,000
72	75½	71	98½	58*	98¾	90¾	36,000	4½s., series "B"	1968	4½	M. N.	16,108,000
98	100	98½	104	99⅞*	103½	79½	178,000	Swift & Co., 5s	1944	5	J. J.	22,916,000
....	100½	99⅜	104½	95*	103⅛	100⅛	36,000	Westvaco Chlorine Prod. 5½s	1937	5½	M. S.	1,992,000

†New high for year

*New low for year

The Trend of Prices

General commodity prices receded further in January. Improvement in manufacturing activity was very slight in most lines. Retail trade was adversely effected by the continuance of unseasonal weather. Chemical Markets' Average Price for 20 representative industrial chemicals showed no change from the revised December figure. The N. Y. Journal of Commerce chemical index also indicated price stability, but the indices of the National Fertilizer Association and also the Analyst were slightly lower.

With the turn of the year and the traditional inventory period over requisitions appeared in much larger numbers. The total volume of shipments, however, showed up very poorly when compared with the same month a year ago.

Several price reductions were reported, but generally speaking heavy chemicals were quite stable. The bichromate market after a precipitous decline from seven to five cents appeared to be well intrenched at the latter figure. Inquiry in the market failed to disclose any prices below five cents, and with consumers practically 100 per cent. contracted it is thought unlikely that producers contemplate further concessions.

Improvement

In the fertilizer industry the improved tone of November and December carried over into the new year and while tonnages are below last year, prices appear to have been thoroughly deflated except in a few instances and the industry generally is in a much more optimistic frame of mind.

Several important price reductions were announced in intermediates; a decline in volume of shipments of benzene, solvent naphtha, and xylene was reported; cream of tartar, still highly competitive, was reduced a cent; potassium carbonate, calcined and hydrated grades, was weak and chromic acid was slashed further. Zinc metal developed extreme weakness and a new low record for 32 years was reached in the last week of the month.

Industries that are large consumers of industrial chemicals failed to gain as much ground as was hoped for. Textile activity increased rather satisfactorily and Detroit automobile production schedules were stepped up, but the leather, glass, and soap industries are still holding operations to fairly low levels. The usual trend of industrial chemical consumption is upward in February and March, the latter sharing with October the distinction of being the largest consumption month. For this reason manufacturers are looking forward to improved conditions in the next 60 day period.

Chemical indices of the National Fertilizer Association all showed declines. The loss in the fats and oils group was much greater than in the other three.

	Fats & Oils	*Chem. & Drugs*	*Fert. Mat.*	*Mixed Fert.*
Jan. 2	53.2	88.9	70.3	79.6
Jan. 9	50.6	88.9	70.3	79.6
Jan. 16	48.1	88.8	70.1	79.1
Jan. 30	48.6	88.8	70.1	79.1

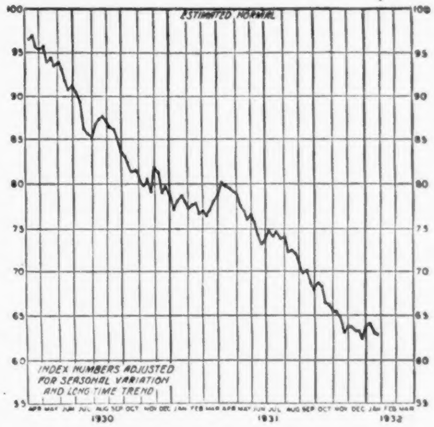
The chemical index of chemical prices of the Analyst stood as follows; Jan. 5, 96.8; Jan. 12, 96.8; Jan. 19, 96.6; Jan. 26, 96.6, while the Journal of Commerce chemical index stood at 81.3 during the entire month.

In many parts of the country January was a particularly warm month and this condition had a very detrimental effect on nearly all lines. Instead of being a month of advances industry generally appeared to be waiting the outcome of the legislation authorizing the Reconstruction Finance Corporation and the rail wage negotiations at Chicago. The foreign situation was very unsettled. Some stimulus has been given to retail trade by bargain and clearance sales, but the results of these were disappointing. Collections were painfully slow.

In the heavy industries a very slight improvement was reported in steel production brought about by enlarged automobile demand following the showing of new models. Building continues in the doldrums with little likelihood of any immediate improvement.

Prices in the commodity markets were generally lower, but the severity of the decline, is of course, much less. Foodstuffs, fuel, paint materials pulp and paper, and metals were lower while textiles and most of the grains showed slight increases.

The *N. Y. Times'* weekly index of business activity is practically unchanged at about the average level of the last nine weeks.



The following table gives the combined index and its components, each of which is adjusted for seasonal variation and where necessary for longtime trend:

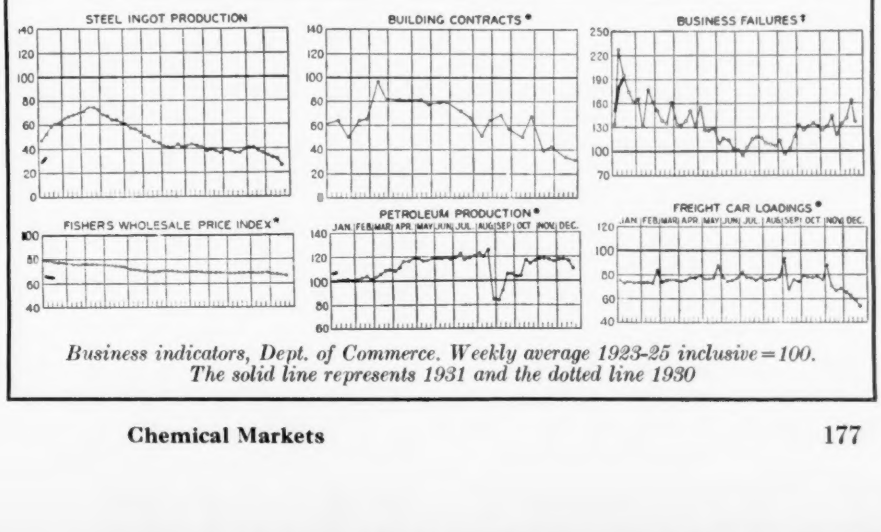
	Week Ended Jan. 23 1932	*Jan. 16 1932*	*Jan. 24 1931*
Freight car loadings	*61.9	62.4	78.5
Steel mill activity	32.0	29.8	56.1
Electric power production	73.9	73.8	85.3
Automobile production	42.1	46.9	64.7
Carded cotton cloth prod.	94.2	90.2	80.7
Combined index	*62.9	63.1	78.1

*Subject to revision.

Indices of Business

	Latest Available Month	Previous Month	Year Ago
Automobile Production, November	68,867	80,142	136,754
†Brokers Loans, Jan. 1	$587	$730	$1,893
*Building Contracts, Dec.	$136,851	$151,195	$249,935
*Car Loadings, Jan. 30	573	572	691
†Commercial Paper, Dec. 31	$117	$174	$358
Payrolls, November	56.2	59.4	75.1
*Mail Order Sales, Nov.	$45,898	$52,280	$55,713
Failures, Dun, Dec.	2,758	2,195	2,525
*Merchandise Imports, Dec.	$153,000	$150,000	$208,636
*Merchandise Exports, Dec.	$184,000	$193,000	$274,856
Furnaces in Blast, Jan. 1	17.8	21.3	30.3
*Steel Orders, Dec. 31	2,735	2,933	3,943

*000 omitted. †000,000 omitted.



Business indicators, Dept. of Commerce. Weekly average 1923-25 inclusive = 100. The solid line represents 1931 and the dotted line 1930

Prices Current

Heavy Chemicals, Coaltar Products, Dye-and-Tanstuffs, Colors and Pigments, Fillers and Sizes, Fertilizer and Insecticide Materials, Naval Stores, Fatty Oils, etc.

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f. o. b. works are specified as such. Imported chemicals are so designated. Resale stocks when a market factor are quoted in addition to makers' prices and indicated "second hands."

Oils are quoted spot New York, ex-dock. Quotations f.o.b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f. o. b., or ex-dock. Materials sold f. o. b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both. Containers named are the original packages most commonly used.

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1931 Average $1.404 - Jan. 1931 $1.283 - Jan. 1932 $1.54

Important Price Changes

Advances	Dec.	Nov.
Mangrove bark, ship	$25.00	$24.00
Myrabolans, J, 2	15.50	15.00
R, 2	15.50	14.50
Silica, paint grade	18.00	16.00
Sodium silicofluoride	.05¼	.04¾
Wax, candelilla	.14	.13½
Wattle bark, ship	33.00	31.00
Declines		
Acid, chromic	.13¼	.14
Alpha naphthol, tech	.65	.73
Benzyl acetate	.60	.65
Bismuth metal	1.00	1.15
Cream of tartar	.19¼	.20¼
Dextrine, white	3.29	3.37
Dextrine, gum	3.59	3.67
Dextrine, canary	3.34	3.42
Dinitrophenol	.23	.29
Diphenylamine	.34	.37
Dried Blood	1.80	1.90
Egg Albumen	.84	.88
Egg Yolk, gran	.51	.54
Ground Bone	22.50	23.00
Steam Bone	18.50	19.00
Glycerine, soap lye	.04⅝	.04¾
Orthotoluidin	.20	.28
Paratoluidine	.20	.28
Paraminophenol base	.78	.82
Potassium carb., cal. 96-98%	.0549	.0574
Potassium carbonate, hyd	.0485	.0510
Schaeffers Salt	.48	.53
Sodium fluoride	.07	.07½
Wax, Carnauba No. 1	.23	.26
Wax, Carnauba No. 2	.21	.25
Wax, Carnauba No. 2 N. C.	.15	.16

CHEMICAL MARKETS' Average Price for 15 representative industrial chemicals showed no change from the revised figure for December. The Price now stands at .0633c. The Price on Jan. 1, 1930 stood at .0732c and .0676c on Jan. 1, 1931. The following industrial chemicals comprise the Average Price: acids, acetic and sulfuric, ammonia anhydrous, caustic soda, copper sulfate, chlorine, betanaphthol, phenol, formaldehyde, carbon tetrachloride, synthetic methanol, ethyl acetate, lithopone, red lead, zinc oxide, sodium nitrate, trisodium phosphate and caustic potash.

Acetone — Some improvement in tonnages was reported, but as yet volume has not been satisfactory for this period of the year. The immediate future is dependent upon the lacquer industry and that in turn on the automobile industry. The N. Y. Show is over and almost without exception inside reports are that the show was a much better success than the previous one. Likewise, reports from Detroit are optimistic. Belief is general that 1932 will show a return at least to 1930 levels.

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Acetaldehyde, drs lc-1 wks...lb.	.18½	.21	.18½	.21	.21	.18½	.21	.18½
Acetaldol, 50 gal dr...lb.	.27	.31	.27	.31	.31	.27	.31	.27
Acetamide...lb.	.95	1.35	.95	1.35	1.35	1.20		
Acetanilid, tech, 150 lb bbl...lb.	.20	.23	.20	.23	.23	.21	.24	.21
Acetic Anhydride, 92-95%, 100 lb cbys...lb.	.21	.25	.21	.25	.29	.25	.35	.28
Acetin, tech drums...lb.	.30	.32	.30	.32	.32	.30	.32	.30
Acetone, tanks,...lb.	...	.10	.10	.10½	.12	.11	.16	.11
Acetone Oil, bbls NY...gal.	1.15	1.25	1.15	1.25	1.25	1.15	1.25	1.15
Acetyl Chloride, 100 lb cby...lb.	.55	.68	.55	.68	.68	.55	.68	.45
Acetylene Tetrachloride (see tetrachlorethane)...								
Acids								
Acid Abietic...	.12	.12	.12	.12	.....	.....	.....	.....
Acetic, 28% 400 lb bbls c-1 wks...100 lb.	2.40	2.60	2.40	2.60	3.88	2.60	3.88	3.88
Glacial, bbl c-1 wk...100 lb.	8.35	8.60	8.35	9.23	13.68	9.23	13.68	13.68
Glacial, tanks...	8.10	.....	8.10	8.98	13.43	8.98		
Adipic...	.72	.72	.72	.72	.....	.....	.....	.....
Anthranilic, refd, bbls...lb.	.85	.95	.85	.95	1.00	.85	1.00	.98
Technical, bbls...lb.	.65	.70	.65	.80	.80	.75	.80	.80
Battery, cbys...100 lb.	1.60	2.25	1.60	2.25	2.25	1.60	2.25	1.60
Benzoic, tech, 100 lb bbls...lb.	.35	.45	.35	.45	.53	.40	.60	.51
Boric, crys. powd, 250 lb. bbls...lb.	.06½	.07	.06½	.07¾	.07¾	.06¾	.07¾	.05¾
Broenner's, bbls...lb.	1.20	1.25	1.20	1.25	1.25	1.20	1.25	1.25
Butyric, 100% basis cbys...lb.	.80	.85	.80	.85	.90	.80	.90	.85
Camphoric...lb.	.....	5.25	.....	5.25	5.25	5.25	5.25	4.85
Chlorosulfonic, 1500 lb drums wks...lb.	.04½	.05½	.04½	.05½	.05½	.04½	.05½	.04½
Chromic, 99¾%, drs...lb.	.13¼	.14½	.14½	.17	.19	.15	.23	.17½
Chromotropic, 300 lb bbls...lb.	1.00	1.06	1.00	1.06	1.06	1.00	1.06	1.00
Citric, USP, crystals, 230 lb. bbls...lb.	.....	.33½	.33½	.43	.59	.40	.70	.46
Cleve's, 250 lb bbls...lb.	.52	.54	.52	.54	.54	.52	.59	.52
Cresylic, 95%, dark drs NY...gal.	.42	.47	.42	.60	.70	.54	.54	.60
97-99%, pale drs NY...gal.	.49	.50	.49	.60	.77	.58	.77	.72
Formic, tech 90%, 140 lb. cby...lb.	.10½	.12	.10½	.12	.12	.10½	.12	.10½
Gallic, tech, bbls...lb.	.60	.70	.60	.70	.55	.50	.12	.50
USP, bbls...lb.	.....	.74	.....	.74	.74	.74	.55	.74
Gamma, 225 lb bbls wks...lb.	.77	.80	.77	.80	.80	.77	.80	.74
H, 225 lb bbls wks...lb.	.60	.65	.60	.70	.70	.65	.99	.80
Hydriodic, USP, 10% soln cby lb.	.....	.67	.....	.67	.67	.67	.72	.67
Hydrobromic, 48%, coml, 155 lb cbys wks...lb.	.45	.48	.45	.48	.48	.45	.67 .48	.45
Hydrochloric, CP, see Acid Muriatic...					.....	.....	.....	.....
Hydrocyanic, cylinders wks...lb.	.80	.90	.80	.90	.90	.80	.90	.80
Hydrofluoric, 30%, 400 lb bbls wks...lb.	.....	.06	.....	.06	.06½	.06	.06	.06
Hydrofluosilicic, 35%, 400 lb bbls wks...lb.	...11	.12	.11	.12	.12	.11	.11	.11
Hypophosphorous, 30%, USP, demijohns...lb.	.....	.85	.....	.85	.85	.85	.85	.85
Lactic, 22%, dark, 500 lb bbls lb.	.04	.04½	.04	.04½	.05	.64	.05½	.04½
44%, light, 500 lb bbls...lb.	.11½	.12	.11½	.12	.12	.11	.12½	.11
Laurent's, 250 lb bbls...lb.	.36	.42	.36	.42	.42	.36	.42	.40
Linoleic...lb.	.16	.16	.16	16	.....	.....	.....	.....
Malic, powd., kegs...lb.	.45	.60	.45	.60	.60	.45	.60	.48
Metanilic, 250 lb bbls...lb.	.60	.65	.60	.65	.65	.60	.65	.60
Mixed Sulfuric-Nitric...								
tanks wks...N unit	.07	.07½	.07	.07½	.07½	.07	.07½	.07
tanks wks...S unit	.008	.01	.008	.01	.01	.008	.01	.008
Monochloroacetic, tech bbl...lb.	.20	.30	.20	.30	.30	.18	.21	.18
Monosulfonic, bbls...lb.	1.65	1.70	1.65	1.70	1.70	1.65	1.70	1.65
Muriatic, 18 deg, 120 lb cbys c-1 wks...100 lb.	.....	1.35	.....	1.35	1.35	1.35	1.40	1.35
tanks, wks. 100 lb.		1.00	.....	1.00	1.00	1.00	1.00	1.00
20 degrees, cbys wks...100 lb.	.....	1.45	.....	1.45	....	1.45	....	1.45
N & W, 250 lb bbls...	.85	.95	.85	.95	.95	.85	.95	.85
Naphthionic, tech, 250 lb...	.60	.65	.60	.65	Nom.	.....	.59	.55
Nitric, 36 deg, 135 lb cbys c-wks...100 lb.	.....	5.00	.....	5.00	5.00	5.00	5.00	5.00
40 deg, 135 lb cbys, c-1 wks...100 lb.	.....	6.00	.....	6.00	6.00	6.00	6.00	6.00
Oxalic, 300 lb bbls wks NY...lb.	.11	.11½	.10¾	.11½	.11¾	.11	.11¾	.11
Phosphoric 50%, U. S. P...lb.	.....	.14	.....	.14	.14	.14	.14	.08
Syrupy, USP, 70 lb drs...lb.	.....	.14	.....	.14	[illegible]	.14	.16	.14
Commercial, tanks,...Unit.	.....	.80	.....	.80	.80	.80	.....	.....
Picramic, 300 lb bbls...lb.	.65	.70	.65	.70	.70	.65	.70	.65
Picric, kegs...lb.	.30	.50	.30	.50	.50	.30	.50	.30
Pyrogallic, crystals...lb.	1.50	1.60	1.50	1.60	1.60	1.30	1.40	.86
Salicylic, tech, 125 lb bbl...lb.	.33	.37	.33	.37	.37	.33	.42	.33
Sulfanilic, 250 lb bbls...lb.	.15	.16	.15	.16	.16	.15	.16	.15
Sulfuric, 66 deg, 180 lb cbys lc-1 wks...100 lb.	1.60	1.95	1.60	1.95	1.95	1.60	1.95	1.60
tanks, wks. ton		15.00	.....	15.00	15.50	15.00	15.50	15.50
1500 lb dr wks...100 lb.	1.50	1.65	1.50	1.65	1.65	1.50	1.65	1.50
60°, 1500 lb dr wks...100 lb.	1.27½	1.42½	1.27½	1.42½	1.42½	1.27½	1.42½	1.27½

Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1931 Average $1.404 - Jan. 1931 $1.283 - Jan. 1932 $1.54

Total new passenger car registrations in the first eleven months of 1931 amounted to 1,830,463 as against 2,530,014 in the same period in 1930. Other encouraging indicators are the fact that the production curve started upward in November and December of 1931 and such figures as are available for January point to a continuance of the upward trend, also the fact that sales for several months have been in excess of production, dealers stocks were at a very low level as the year closed and the undeniable fact that in the past two years a very large replacement back-log has been developing only awaiting some definite change in sentiment to set it loose. Added to all this, automobile producers point to the tremendous values being offered in 1932 cars and ask, "How can the public resist?" With Ford scheduled to swing back shortly into production a further boost in production figures will occur.

Acid Acetic — Resumption in the textile line brought about a wider demand. Statistics seem to point to a continuance of the present price level. What is the situation on stocks of lime? Throughout 1930 there was a continual growth in lime stocks and at the end of the year the tonnage on hand was very nearly twice the figure reported at the beginning. This upward growth continued through May 1931, when stocks were reported to be 26,205,870 pounds. By October 1931 this figure had declined to 10,039,469 pounds, the lowest tonnage for over two years. What is the explanation? Curtailment of production. In the first eleven months of 1930 production amounted to 69,842,331 pounds against only 38,497,533 pounds for the same period in 1931. Production in November, 1930, amounted to 6,534,761 pounds while in November, 1931 only 2,226,255 pounds were produced. For eight months previous to and including November, 1931, shipments have exceeded production by a wide margin.

Acid Sulfuric — The completion of 1932 contracts left the market without any particular interest. Prices remain firm in the face of curtailed tonnage specially in the fertilizer industry. For the first time in years there appears to be real co-operation in the latter industry. After several disastrous years the necessity for reducing production seems to have permeated the minds of the majority of manufacturers and a real effort is being made in this direction. Leading executives hoped for an output of about 60% of 1930. This is more than could reasonably be expected but tag sales to date for 16 states are only 73%

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Oleum, 20%, 1500 lb. drs lc-1 wks ......ton	.....	18 50	.....	18.50	18.50	18.50	18.50	18.50
40%, lc-1 wks net ....ton	...	42.00	.....	42.00	42.00	42.00	42.00	42.00
Tannic, tech, 300 lb bbls...lb.	.23	.40	.23	.40	.40	.23	.40	.30
Tartaric, USP, gran. powd, 300 lb. bbls..........lb	.....	.25½	.25½	.29½	.38½	.33	.38½	.38
Tobias, 250 lb bbls.........lb.	.80	.85	.80	.85	.85	.85	.85	.85
Trichloroacetic bottles......lb.	.....	2.75	.....	2.75	2.75	2.75	2.75	2.75
Kegs..................lb.	.....	2.00	.....	2.00	2.00	2.00	2.00	2.00
Tungstic, bbls............lb.	1.40	1.70	1.40	1.70	1.70	1.40	2.25	1.00
Albumen, blood, 225 lb bbls..lb.	.38	.40	.38	.40	.40	.38	47	.38
dark,.............bbls., lb.	.12	.20	.12	20	.20	.12	.20	.12
Egg, edible...............lb.	.....	.65	.55	.60	.75	.55	.83	.70
Technical, 200 lb cases..lb.	.62	.66	.48	.66	.73	.50	.80	.70
Vegetable, edible..........lb.	.60	.65	.60	.65	.65	.60	.65	.60
Technical..............lb.	.50	.55	.50	.55	.55	.50	.55	.50
Alcohol								
Alcohol Butyl, Normal, 50 gal drs c-l wks............lb.	.1495	.1595	.1495	.17¼	.18¼	.17¼	.17¾	.17¼
Drums, 1-c-1 wks........lb.	.1545	.1645	.1545	.17¾	.18¾	.17¾	.18¼	.17¾
Tank cars wks..........lb.	.....	.143	.143	.16¾	.17¾	.16¾	.17¼	.16¾
Amyl (from pentane) Tanks wks............lb.	.....	.203	.203	.236	.236	.236	1.67	1.67
Diacetone, 50 gal drs del..gal.	1.42	1.60	1.42	1.60	1.60	1.42	1.80	1.42
Ethyl, USP, 190 pf, 50 gal bbls...............gal.	2.55	2.65	2.37	2.75	2.75	2.63	2.75	2.69½
Anhydrous, drums.......gal.	.54	.58	.54	.60	.71	.56	.71	.71
No. 5,*188 pf, 50 gal drs. drums extra.........gal.	.....	.34½	.27	.44	50	.40	.51	.48
*Tank, cars............gal.	.....	.30½	.24	.38	.48	.37	.50	.46
Isopropyl, ref, gal drs.....gal.	.60	.65	.60	1.00	1.00	.60	1.30	1.00
Propyl Normal, 50 gal dr..gal.	.....	1.00	.....	1.00	1.00	1.00	1.00	1.00
Alcotate, tanks............gal.	.....	.60	.60	.60	.....	.....	.....	.....
Aldehyde Ammonia, 100 gal dr lb.	.80	.82	.80	.82	.82	.80	.82	.80
Alpha-Naphthol, crude, 300 lb bbls..................lb.	.60	.65	.60	.65	.65	.60	.65	.65
Alpha-Naphthylamine, 350 lb bbls..................lb.	.32	.34	.32	.34	.34	.32	.34	.32
Alum Ammonia, lump, 400 lb bbls, lc-1 wks.......100 lb.	3.00	3.25	3.00	3.50	3.50	3.20	3.50	3.25
Chrome, 500 lb casks, wks ....100 lb.	4.50	5.25	4.50	5.25	5.25	4.50	5.50	5.00
Potash, lump, 400 lb casks wks...............100 lb.	3.00	3.50	3.00	3.50	3.50	3.10	3.50	3.00
Soda, ground, 400 lb bbls wks...............100 lb.	3.50	3.75	3.50	3.75	3.75	3.50	3.75	3.75
Aluminum Metal, c-1 NY.100 lb.	22.90	24.30	22.90	24.30	24.30	24.30	24.30	24.30
Chloride Anhydrous,......lb.	.05	.09	.05	.09	.15	.05	.20	.05
Hydrate, 96%, light, 90 lb bbls..................lb.	.16	.17	.16	.17	.18	.16	.18	.17
Stearate, 100 lb bbls.......lb.	.20	.21	.18	.22	.26	.19	.26	25
Sulfate, Iron, free, bags c-1 wks..............100 lb.	1.90	1.95	1.90	1.95	2.05	1.90	2.05	1.95
Coml, bags c-1 wks..100 lb.	1.25	1.30	1.25	1.30	1.40	1.25	1.40	1.40
Aminoazobenzene, 110 lb kegs lb.	.....	1.15	.....	1.15	1.15	1.15	1.15	1.15
Ammonium								
Ammonia anhydrous Com. tanks	.....	.05⅝	.....	.05⅝	.05⅝	.05⅝		
Ammonia, anhyd, 100 lb cyl..lb.	.15½	.15½	.15½	.15½	.15½	.15½	.14½	.14
Water, 26°, 800 lb dr del...lb.	.02¾	.03	.02¾	.03½	.03½	.03½	.03½	.03½
Ammonia, aqua 26° tanks....	.....	.02¾	.02½	.02¾	.02¾	.02½		
Acetate..................lb.	.28	.39	.28	.39	.39	.28		
Bicarbonate, bbls., f.o.b. plant ....100 lb.	.....	5.15	.....	5.15	5.15	5.15	6.50	5.15
Bifluoride, 300 lb bbls......lb.	.21	.22	.21	.22	.22	.21	.22	.21
Carbonate, tech, 500 lb cs..lb.	.10½	.12	.09	.12	.12	.09	.12	.09
Chloride, white, 100 lb. bbls wks.............100 lb.	4.45	5.15	4.45	5.15	5.15	4.45	5.15	4.45
Gray, 250 lb bbls wks....lb.	5.25	5.75	5.25	5.75	5.75	5.25	5.75	5.25
Lump, 500 lb cks spot...lb.	.11	.11½	.11	.11½	.11½	.11	.11½	.11
Lactate, 500 lb bbls.......lb.	.15	.16	.15	.16	.16	.15	.16	.15
Ammonium Linoleate.....lb.	.15	.15	.15	.....	.....	.....	.....	.....
Nitrate, tech, casks........lb.	.06	.10	.06	.10	.10	.06	.10	.06
Persulfate, 112 lb kegs.....lb.	.25	.27½	.25	.30	.30	.26	.34	.26
Phosphate, tech, powd, 325 lb bbls..................lb.	.11½	.12	.11½	.12	.13	.11½	.13	.12½
Sulfate, bulk c-1.......100 lb.	.....	1.10	1.10	1.80	2.10	1.75	2.40	2.05
Southern points.....100 lb.	.....	1.25	1.25	1.75	2.10	1.82½	2.45	2.05
Nitrate, 26% nitrogen 31.6% ammonia imported bags c. i. f.........ton	34.60	35.00	34.60	35.00	57.60	45.00	60.85	52.40
Sulfocyanide, kegs........lb.	.36	.48	.36	.48	.48	.36	.48	.36
Amyl Acetate, (from pentane) Tanks.................lb.	.....	.17½	.16	.222	236	.222	1.70	1.60
Tech., drs................lb.	.17½	.18	.16½	.236	24	.225	.24	.23
Alcohol, see Fusel Oil........								
Furoate, 1 lb tins.........lb.		5.00	.....	5.00	5.00	5.00		
Aniline Oil, 960 lb drs........lb.	.14½	.16	.14½	.16	.16	.15	.16½	.15
Annatto, fine...............lb.	.34	.37	.34	.37	.37	.34	.37	.34
Anthraquinone, sublimed, 125 lb bbls..................lb.	.50	.55	.50	.55	.90	.50	.90	.80
Antimony, metal slabs, ton lots ....lb.	.05⅞	.06	.06¼	.07½	.09¼	.06½	.10	.08⅜
Needle, powd, 100 lb cs....lb.	.08½	.09	.08½	.09	.09½	.08	.10	.09
Chloride, soln (butter of) cbys...................lb.	.13	.17	.13	.17	.17	.13	.18	.13
Oxide, 500 lb bbls.........lb.	.08½	.08¾	.08½	.08¾	.08¾	.07½	.10	.08¾
Salt, 66%, tins............lb.	.22	.24	.22	.24	.24	.22	.26	.24
Sulfuret, golden, bbls......lb.	.16	.20	.16	.20	.20	.16	.20	.16
Vermilion, bbls............lb.	.38	.42	.38	.42	.42	.38	.42	.38
Archil, conc, 600 lb bbls......lb.	.17	.19	.17	.19	.19	.17	.19	.17
Double, 600 lb bbls.........lb.	.12	.14	.12	.14	.14	.12	.14	.12
Triple, 600 lb bbls.........lb.	.12	.14	.12	.14	.14	.12	.16	.12
Argols, 80%, casks..........lb.	.....	.18¾	.....	.18¾	.18¾	.18¾	.18¾	.18¾
Crude, 30%, casks........lb.	.07	.07½	.07	.08	08	.07¾	.08	.08

*New formula, prices delivered N. Y.: base price tanks .27½ producing points

Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1931 Average $1.404 - Jan. 1931 $1.283 - Jan. 1932 $1.54

of the same period a year ago. This means, of course, curtailment in consumption of sulfuric. Other large consuming industries, iron and steel, for example, appear likely to increase operations to offset this loss. Sulfuric acid makers have shown great forebearance in the matter of production. How true this is is shown in part by the sulfuric acid production figures of the seventy-six manufacturers of superphosphate who also produce acid. On Nov. 30, 1930 they reported 106,564 tons on hand and on the same day a year later this figure had only increased to 118,976 tons, not a big increase when one considers the slump in superphosphate production that has taken place. The total production for eleven months of 1930 amounted to 4,203,057 tons as against 2,513,844 tons for the same period in 1931.

Alkalies — Soda ash and caustic consumption improved with the turn of the year. Stocks were, in practically every instance, held at the lowest possible figure for the inventory period. This action brought in many large orders in the second and third weeks of the month. Chlorine tonnage was reported to be satisfactory for this time of the year and considering the present status of the paper and wood pulp industry. Indicative of the tremendous volume of chemicals consumed in these allied industries is given by figures of consumption of the Canadian wood pulp and paper industries for 1930.

Wood Pulp

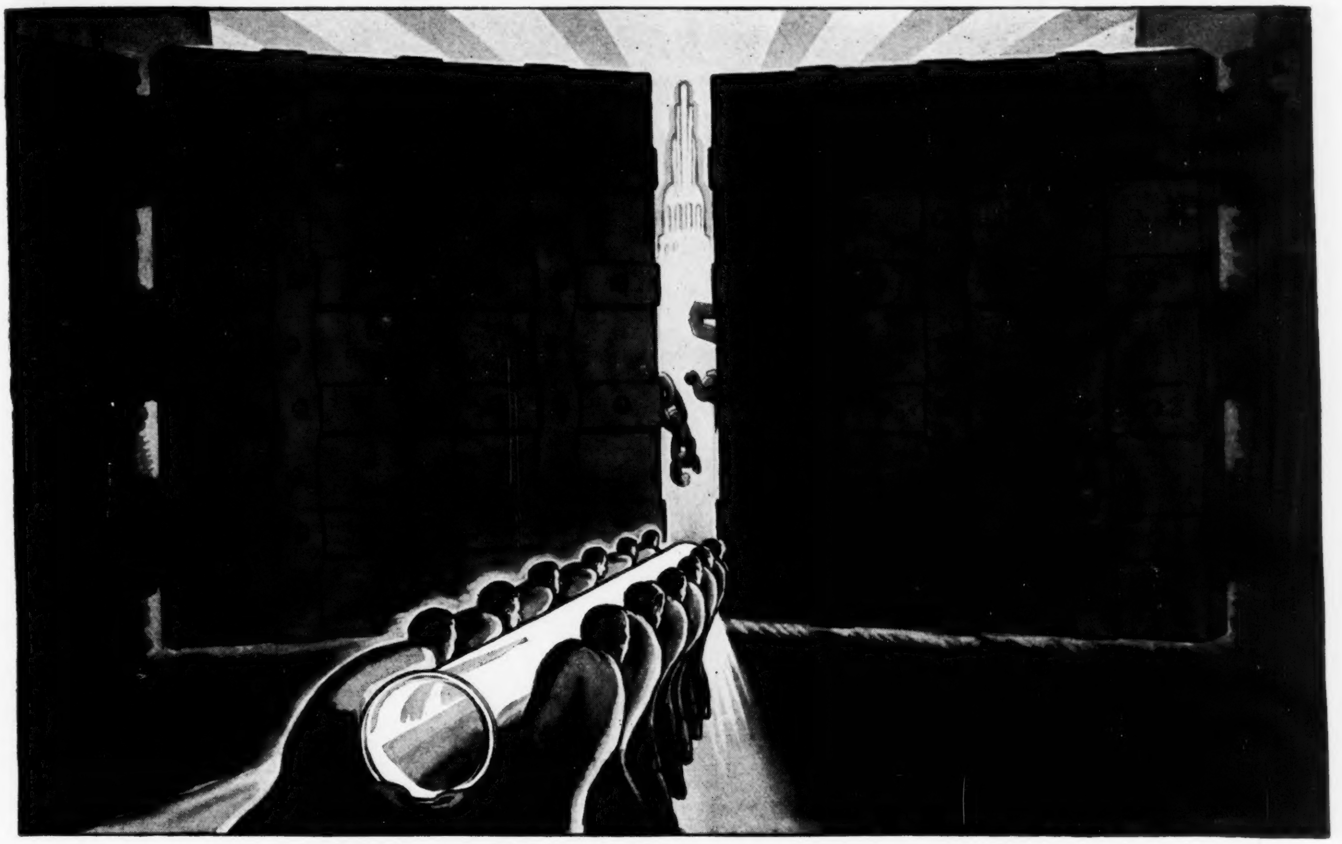
	Tons	*Value*
Sulfur	154,889	$3,689,617
Limestone	169,020	529,879
Lime	81,407	812,822
Soda ash	1,545	60,796
Liquid chlorine	14,192	925,949
Other bleach	6,604	147,473
Salt cake	33,119	676,597
Common salt	8,960	91,730
All other chemicals	681	32,556
Totals	470,417	$6,967,419

Paper

	Tons	*Value*
Soda ash	1,993	$70,864
Alum	21,951	630,410
Clay	13,024	218,423
Size	7,028	516,928
Dyes and colors	......	329,362
Other materials, including, asphalt, rosin, caustic soda, talc, starch, copperas, lime, liquid chlorine, bleaching powder, and fillers	......	4,384,563
Total	......	$6,150,550

Ammonia, Anhydrous — The unseasonal warm weather that prevailed in most sections of the country in January aided in keeping deliveries at a fairly high level. The past contract season was a very successful one from the manufacturer's viewpoint, as was also the tonnages sold in cylinders in 1931. Increased production, better production methods, and the intro-

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Aroclors, wks....lb.	.20	.40	.20	.40	.40	.20	.....	.....
Arsenic, Red. 224 lb kegs, cs..lb.	.09¾	.10	.09¾	.10	.11	.08¾	.11	.09
White, 112 lb kegs....lb.	.04	.05	.03¾	.05	.04½	.03¾	.04½	.04
Asbestine, c-1 wks....ton	.....	15.00	.....	15.00	15.00	15.00	15.00	4.75
Barium								
Barium Carbonate, 200 lb bags wks....ton	56.50	57.00	56.50	60.00	60.00	58.00	60.00	57.00
Chlorate, 112 lb kegs NY..lb.	.14	.15	.14	.15	.15	.14	.15	.14
Chloride, 600 lb bbl wks...ton	63.00	69.00	63.00	69.00	69.00	63.00	69.00	63.00
Dioxide, 88%, 690 lb drs...lb.	.12	.13	.12	.13	.13	.12	.13	.12
Hydrate, 500 lb bbls....lb.	.04¾	.05½	.04¾	.05½	.05½	.04¾	.05½	.04¾
Nitrate, 700 lb casks....lb.	.07½	.08	.07½	.08½	.08½	.07½	.08½	.08
Barytes, Floated, 350 lb bbls wks....ton	23.00	24.00	23.00	24.00	24.00	23.00	24.00	23.00
Bauxite, bulk, mines....ton	5.00	6.00	5.00	8.00	8.00	5.00	8.00	5.00
Beeswax, Yellow, crude bags..lb.	.22	.24	.22	.31	.34	.24	.37	.34
Refined, cases....lb.	.25	.28	.25	.37	.38	.37	.42	.39
White, cases....lb.	.34	.36	.34	.36	.53	.34	.53	.51
Benzaldehyde, technical, 945 lb drums wks....lb.	.60	.65	.60	.65	.65	.60	.65	.60
Benzene								
Benzene, 90%, Industrial, 8000 gal tanks wks....gal.	.....	.20	.18	.21	.22	.21	.23	.23
Ind. Pure, tanks works....gal.	.....	.20	.18	.21	.22	.21	.23	.23
Benzidine Base, dry, 250 lb bbls....lb.	.65	.67	.65	.67	.74	.65	.74	.70
Benzoyl, Chloride, 500 lb drs.lb.	.45	.47	.45	.47	1.00	.45	1.00	1.00
Benzyl, Chloride, tech drs....lb.	.....	.30	.....	.30	.25	.25	.25	.25
Beta-Naphthol, 250 lb bbl wk.lb.	.....	.22	.22	.24	.24	.22	.26	.22
Naphthylamine, sublimed, 200 lb bbls....lb.	1.25	1.35	1.25	1.35	1.35	1.25	1.35	1.35
Tech, 200 lb bbls....lb.	.53	.58	.53	.65	.65	.53	.68	.60
Blanc Fixe, 400 lb bbls wks..ton	75.00	90.00	75.00	90.00	90.00	75.00	90.00	75.00
Bleaching Powder								
Bleaching Powder, 800 lb drs c-1 wks contract....100 lb.	1.75	2.00	1.75	2.35	2.35	2.00	2.25	2.00
Blood, Dried, fob, NY....Unit	1.80	1.90	1.65	3.00	3.90	3.00	4.60	3.90
Chicago....Unit	1.50	1.60	1.50	2.35	4.50	2.75	5.00	4.40
S. American shipt....Unit	.....	Nom.	2.00	3.20	4.10	3.15	4.70	4.25
Blues, Bronze Chinese Milori Prussian Soluble....lb.	.....	.35	.....	.35	.35	.35	.35	.32
Bone, raw, Chicago....ton	21.00	21.50	21.00	32.00	39.00	31.00	42.00	39.00
Bone, Ash, 100 lb kegs....lb.	.06	.07	.06	.07	.07	.06	.07	.06
Black, 200 lb bbls....lb.	.05½	.08½	.05½	.08½	.08½	.05½	.08½	.08½
Meal, 3% & 50%, Imp....ton	.....	21.00	21.00	31.00	31.00	31.00	35.00	30.00
Borax, bags....lb.	.02½	.03½	.02½	.03½	.03½	02½	.03½	.02½
Bordeaux, Mixture, 16% pwd..lb.	.11½	.13	.11½	.13	.14	.12	.14	.10½
Paste, bbls....lb.	.11½	.13	.11½	.13	.14	.12	.14	.10
Brazilwood, sticks, shpmt....lb.	26.00	28.00	26.00	28.00	28.00	26.00	28.00	26.00
Bromine, cases....lb.	.36	.43	.36	.43	.47	.38		
Bronze, Aluminum, powd blk.lb.	.60	1.20	.60	1.20	1.20	.60	1.20	.60
Gold bulk....lb.	.55	1.25	.55	1.25	1.25	.55	1.25	.55
Butyl, Acetate, normal drs..lb.	.161	.166	.161	.175	.20	.17	.195	.184
Tank, wks....lb.	.....	.143	.143	.175	.186	.16	.186	.181
Aldehyde, 50 gal drs wks...lb.	.34	.36	.34	.44	.44	.34	.70	.34
Carbitol s ee Diethylene Glycol Mono (Butyl Ether)........	.....	.....	.....	.....	.....	.....	.....	.....
Cellosolve (see Ethylene glycol mono b utyl ether)........								
Furoate, tech., 50 gal. dr., lb.	.....	.50	.....	.50	.50	.50	.50	.50
Propionate, drs....lb.	.22	.25	.22	.25	.27	.22	.36	.25
Stearate, 50 gal drs....lb.	.....	.25½	.25	.30	.30	.25	.60	.25
Tartrate, drs....lb.	.55	.60	.55	.60	.60	.55	.60	.57
Cadmium, Sulfide, boxes....lb.	.65	.90	.65	.90	1.75	.90	1.75	.75
Calcium								
Calcium, Acetate, 150 lb bags c-1....100 lb.	.....	2.00	.....	2.00	4.50	2.00	4.50	4.50
Arsenate, 100 lb bbls c-1 wks....lb.	.06	.08	.06	.09	.09	.07	.09	.07
Carbide, drs....lb.	.05	.06	.05	.06	.06	.05	.06	.05
Carbonate, tech, 100 lb bags c-1....lb.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Chloride, Flake, 375 lb drs c-1 wks....ton	.....	21.00	21.00	22.75	22.75	22.75	25.00	22.75
Solid, 650 lb drs c-1 fob wks....ton	.....	18.00	18.00	20.00	20.00	20.00	20.00	20.00
Nitrate, 100 lb bags....ton	34.00	35.00	34.00	43.00	43.00	40.00	52.00	42.00
Peroxide, 100 lb. drs....lb.	.....	1.25	.....	1.25	1.25	1.25	1.25	1.25
Phosphate, tech, 450 lb bbls lb.	.08	.08¾	.08	.08¾	.08¾	.08	.08	.07
Stearate, 100 lb bbls....lb.	.17	.18	.17	.22	.26	.19	.26	.25
Calurea, bags S. points. c.i.f. ton	.....	88.65	.....	88.65	88.65	88.65	88.15	82.15
Camwood, Bark, ground bbls..lb.	.....	.18	.....	.18	.18	.18	.18	.18
Candelilla Wax, bags....lb.	.....	.14	.13	.15	.20	.15	.24	.22
Carbitol, (See Diethylene Gycol Mono Ethyl Ether).......	.....	.....	.....	.....	.....	.....	.....	.....
Carbon, Decolorizing, 40 lb bags c-1....lb.	.08	.15	.08	.15	.15	.08	.15	.08
Black, 100-300 lb cases 1c-1 NY....lb.	.06	.12	.06	.12	.12	.06	.12	.12
Bisulfide, 500 lb drs 1c-1 NY....lb.	.05½	.06	.05½	.06	.06	.05½	.06	.05½
Dioxide, Liq. 20-25 lb cyl...lb.	.....	.06	.....	.06	.18	.06	.06	.06
Tetrachloride, 1400 lb drs delivered....lb.	.06½	.07	.06½	.07	.07	.06½	.07½	.06½
Carnauba Wax, Flor, bags....lb.	.26	.28	.26	.28	.37	.28	.43	.35
No. 1 Yellow, bags....lb.	.23	.24	.23	.40	.33	.25	.40	.33
No. 2 N Country, bags....lb.	.15	.16	.15	.23	.27	.20	.32	.28
No. 2 Regular, bags....lb.	.21	.22	.21	.23	.30	.23	.36	.31
No. 3 N. C....lb.	.11	.12	.11	.11	.23	.16	.25	.24
No. 3 Chalky....lb.	.11	.12	.11	.13½	.23	.16	.26	.24
Casein, Standard, Domestic.... ground....lb.	.....	.07½	.06	.10	.15½	.09½	.17	.15



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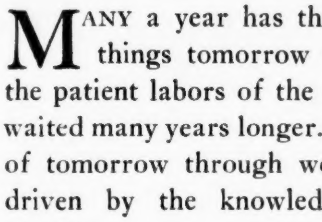
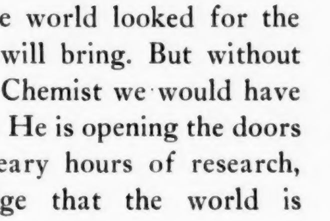
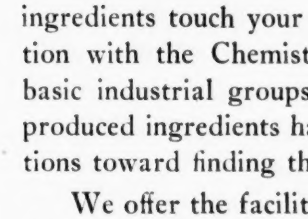


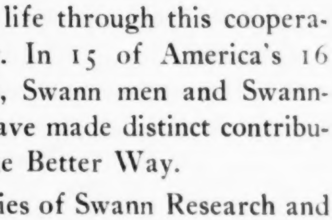
··· Anniston ··



··· St. Louis ···



··· Hoopeston ······



Camden ···

Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1931 Average $1.404 - Jan. 1931 $1.283 - Jan. 1932 $1.54

duction of tank cars for the transportation of anhydrous ammonia have made ammonia available at a price 78% below the 1914 level. For the same three reasons ammonia may gradually go lower. Ammonia is very definitely a very important factor in the alkali structure and competitive with caustic, ash, and lime. Such developments are long term possibilities, however. In connection with the future of ammonia it is interesting to read in the annual report of the U. S. Secretary of Agriculture about the possibility of direct use of ammonia in the treatment of superphosphate. After discussing the advantages and disadvantages of this method Secretary Hyde goes on to say, "Accordingly, state officials are taking steps which will permit an increase of about 100% in the use of free ammonia in fertilizer manufacture. This will mean an increase of about 80,000 tons per annum in the use of synthetic ammonia. This quantity is worth at wholesale about $8,000,000."

Ammonium Sulfate — No change occurred during the past month in the price structure. Imported is still being quoted at $20 and domestic $2 higher. With steel production down to 26-27% supplies are over plentiful. The U. S. receipts of 14,947 long tons of foreign ammonium sulfate during November brought the total for the first 11 months of 1931 to 90,327 long tons as compared with 34,964 entered in the entire year 1930. Belgium lead as a source of supply in November with 5,978 long tons followed by Netherlands, 3,106; Germany, 2,969; France, 950; Japan, 913; United Kingdom, 818; and Canada, 213 long tons.

Borax — General conditions in this market have not changed for some time. Prices are well maintained and considering conditions generally tonnages are good. Of the November exports of 21,950,682 pounds, Japan received 2,957,440 pounds; Germany, 7,902,276 pounds; United Kingdom, 5,426,004 pounds; France, 2,431,868 pounds; Netherlands, 1,931,130 pounds; Belgium, 316,000 pounds, and Canada, 185,080 pounds.

Camphor — Prices remained unaltered with demand showing some signs of improvement. Imports of natural crude camphor into the U. S. during 1931 gained appreciably in both quantity and value over 1930 purchases. Imports of natural refined camphor increased in quantity but were lower in value. Synthetic camphor purchased abroad dropped in both quantity and value. Import statistics follow:

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Cellosolve (see Ethylene glycol mono ethyl ether).........								
Acetate (see Ethylene glycol mono ethyl ether acetate)..								
Celluloid, Scraps, Ivory cs....lb.	.13	.15	.13	.15	.20	.20	.30	.20
Shell, cases...............lb.	.18	.20	.18	.20	.20	.18	.20	.18
Transparent, cases........ lb.	.....	.15	.....	.15	.15	.15	.32	.15
Cellulose, Acetate, 50 lb kegs .lb.	.80	1.25	.80	1.25	1.25	.80	1.25	1.20
Chalk, dropped, 175 lb bbls...lb.	.03	.03¾	.03	.03¾	.03¾	.03	.03¾	.03
Precip, heavy, 560 lb cks...lb.	.02	.03½	.02	.03½	.03½	.02	.03½	.02
Light, 250 lb casks........lb.	.02½	.03½	.02½	.03½	.03½	.02½	.03½	.02
Charcoal, Hardwood, lump, bulk wks...................bu.	.18	.19	.18	.19	.19	.18	.19	.18
Willow, powd, 100 lb bbl wks.....................lb.	.06	.06½	.06	.06½	.06½	.06	.06½	.06
Wood, powd, 100 lb bbls...lb.	.04	.05	.04	.05	.05	04	.05	.04
Chestnut, clarified bbls wks,..lb.	.01¾	.02	.01¾	.03	.03	.02¼	.02	.03¼
25% tks wks.............lb.	.01¾	.02½	.01¾	.02½	.02½	.01¾	.02½	.01¾
Powd, 60%, 100 lb bgs wks.lb.	.....	.04½	.....	.04½	.04½	.04½	.04 ⁴/₅	.04½
Powd, decolorized bgs wks..lb.	.05½	.06	.05½	.06	.06	.05½	.06	.05½
China Clay, lump, blk mines.ton	8.00	9.00	8.00	9.00	9.00	8.00	9.00	8.00
Powdered, bbls...........lb.	.01¾	.02	.01¾	.02	.02	.01¾	.02	.01¾
Pulverized, bbls wks......ton	10.00	12.00	10.00	12.00	12.00	10.00	12.00	10.00
Imported, lump, bulk.....ton	15.00	25.00	15.00	25.00	25.00	15.00	25.00	15.00
Powdered, bbls...........lb.	.01¾	.03	.01¾	.03	.03	.01¾	.03½	.01¾
Chlorine								
Chlorine, cyls 1c-1 wks contract ....lb.	.07	.08½	.07	.08½	.08½	.07	.08½	.07
cyls, cl wks,. contract ...lb.	.04	.04½	.04	.04½	.04½	.04	.04½	.04½
Liq tank or multi-car lot cyls wks contract............lb.	.01¾	.02½	.01¾	.02½	.025	.01¾	.03	.025
Chlorobenzene, Mono, 100 lb. drs 1c-1 wks...........lb.	.10	.10½	.10	.10½	.10½	.10	.10½	.08½
Chloroform, tech, 1000 lb drs..lb.	.15	.16	.15	.16	.16	.15	.20	.16
Chloropicrin, comml cyls.....lb.	1.00	1.35	1.00	1.35	1.35	1.00	1.35	1.00
Chrome, Green, CP..........lb.	.26	.29	.26	.29	.29	.26	.29	.26
Commercial...............lb.	.06½	.11	.06½	.11	.11	.06½	.11	.06½
Yellow...................lb.	.16	.18	.16	.18	.18	.16	.18	.15
Chromium, Acetate, 8% Chrome bbls....................lb.	.04¾	.05¾	.04¾	.05¾	.05¾	.04¾	.05¾	.04¾
20° soln, 400 lb bbls.....lb.	.....	.05½	.....	.05½	.05½	.05½	.05½	.05½
Fluoride, powd, 400 lb bbl..lb.	.27	.28	.27	.28	.28	.27	.28	.27
Oxide, green, bbls.........lb.	.34½	.35½	.34½	.35½	.35½	.34½	.35½	.34½
Coal tar, bbls..............bbl	10.00	10.50	10.00	10.50	10.50	10.00	10.50	10.00
Cobalt Oxide, black, bags....lb.	1.35	1.45	1.35	2.22	2.22	2.10	2.22	2.10
Cochineal, gray or black bag..lb.	.52	.57	.52	.57	1.01	.52	1.01	.95
Teneriffe silver, bags.......lb.	.....	.57	.55	.57	.95	.54	.95	.95
Copper								
Copper, metal, electrol....100 lb.	.....	7.25	6.25	10.36	17.78	9.50	24.00	17.00
Carbonate, 400 lb bbls.....lb.	.08½	.16½	.08½	.16½	.21½	.08½	.25	.13
Chloride, 250 lb bbls.......lb.	.22	.25	.22	.25	.28	.22	.28	.25
Cyanide, 100 lb drs........lb.	.39	.40	.39	.42	.45	.41	.60	.44
Oxide, red, 100 lb bbls.....lb.	.15	.16	.15	.18	.32	.15½	.32	.16½
Sub-acetate verdigris, 400 lb bbls....................lb.	.18	.19	.18	.19	.19	.18	.19	.18
Sulfate, bbls c-1 wks...100 lb.	.....	3.10	3.10	4.95	5.50	3.95	7.00	5.50
Copperas, crys and sugar bulk c-1 wks................ton	.....	14.50	13.00	14.00	14.00	13.00	14.00	13.00
Cotton, Soluble, wet, 100 lb bbls....................lb.	.40	.42	.40	.42	.42	.40	.42	.40
Cottonseed, S. E. bulk c-1...ton	.....	26.50	.....	26.50	.....	.....	.....	.....
Meal S. E. bulk..........ton	.....	.....	.....	.....	.....	.....	.....	.....
7% Amm., bags mills...ton	13.25	38.00	13.25	38.00	38.00	37.50	38.00	37.50
Cream Tartar, USP, 300 lb. bbls....................lb.	.19¼	.20¼	.20¼	.24½	.27	.24¼	.28	26½
Creosote, USP, 42 lb cbys....lb.	.40	.42	.40	.42	.42	.40	.42	.40½
Oil, Grade 1 tanks.......gal.	.11½	.12½	.11½	.14	.16	.15	.19	.15
Grade 2...............gal.	.10½	.11½	.10½	.12	.14	.13	.23	.13
Grade 3...............gal.	.10½	.11½	.10½	.12	.14	.13	.28	.13
Cresol, USP, drums..........lb.	.10½	.11	.10½	.17	.17	.14	.17	.14
Crotonaldehyde, 50 gal dr....lb.	.32	.36	.32	.36	.36	.32	.36	.32
Cudbear, English............lb.	.16	.17	.16	.17	.17	.16	.17	.16
Cutch, Rangoon, 100 lb bales..lb.	.10	.12	.10	.13	.13	.11	.16	.12½
Borneo, Solid, 100 lb bale..lb.	.05½	.07	.05½	.08½	.08½	.06½	.08½	.08
Cyanamide, bags c-1 frt allowed Ammonia unit............	...	.97½	.97½	.....	.....	.....	.....	.....
Dextrin, corn, 140 lb bags.100 lb.	3.59	3.67	3.47	4.02	4.82	4.42	4.92	4.62
White, 140 lb bags.....100 lb.	3.27	3.37	3.37	4.02	4.77	4.17	4.87	4.57
Potato, Yellow, 220 lb bgs..lb.	.08	.09	.08	.09	.09	.08	.09	.08
White, 220 lb bags 1c-1....lb.	.08	.09	.08	.09	.09	.08	.09	.08
Tapioca, 200 lb bags 1c-1...lb.	.08¼	.08¾	.08¼	.08¾	.08½	.08	.08½	.08
Diamylphthalate, drs wks...gal.	.....	3.80	.....	3.80	3.80	3.80	3.80	3.80
Dianisidine, barrels..........lb.	2.35	2.70	2.35	2.70	2.70	2.35	3.10	2.70
Dibutylphthalate, wks.......lb.	.228	.23	.228	.28	.28	.24½	.26½	.26½
Dibutyltartrate, 50 gal drs....lb.	.29½	.31½	.29½	.31½	.31½	.29½	.31½	.29½
Dichloroethylether, 50 gal drs lb.	.....	.06	.....	.06	.07	.05	.13	.05
Dichloromethane, drs wks....lb.	.55	.65	.55	.65	.65	.55	.65	.55
Diethylamine, 400 lb drs.....lb.	2.75	3.00	2.75	3.00	3.00	2.75	3.00	2.75
Diethylcarbonate, drs ......gal.	1.85	1.90	1.85	1.90	1.90	1.85	1.90	1.85
Diethylaniline, 850 lb drs.....lb.	.55	.60	.55	.60	.60	.55	.60	.55
Diethyleneglycol, drs........lb.	.14	.16	.14	.16	.13	.10	.13	.10
Mono ethyl ether, drs....lb.	.15	.16	.15	.16	.16	.13	.15	.13
Mono butyl ether, drs....lb.	.24	.30	.24	.30	.30	.24	.30	.25
Diethylene oxide, 50 gal dr....lb.	.....	.50	.....	.50	.50	.50	.50	.50
Diethylorthotoluidin, drs.....lb.	.64	.67	.64	.67	.67	.64	.67	.64
Diethyl phthalate, 1000 lb drums..................lb.	.23	.26	.23	.26	.26	.24	.26	.24
Diethylsulfate, technical, 50 gal drums..................lb.	.30	.35	.30	.35	.35	.30	.35	.30
Dimethylamine, 400 lb drs...lb.	.....	2.62	.....	2.62	2.62	2.62	2.62	2.62
Dimethylaniline, 340 lb drs...lb.	.25	.27	.25	.28	.28	.26	.32	.26

Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1931 Average $1.404 - Jan. 1931 $1.283 - Jan. 1932 $1.54

	1930 Pounds	Value
Camphor:		
Natural crude	1,058,400	$419,300
Natural refined	1,031,600	556,700
Synthetic	2,404,700	850,800

	1931 Pounds	Value
Camphor:		
Natural crude	2,009,700	$716,200
Natural refined	1,151,800	545,800
Synthetic	1,798,100	587,600

Coal-Tar Chemicals — Several price reductions were reported in January (See list on page 178). Future developments in the coal-tar division, of course, are highly dependent upon the immediate future in the steel industry. This division of industrial chemicals has withstood much better the general decline in prices aided by the decline in steel operations. Where in most lines over-production has forced down the price level, such items as benzol, toluol, and products made from these chemicals, have been, in many instances, actually scarce. Imports of synthetic dyes last year totaled 4,735,045 pounds with an invoice value of $4,108,514 against 4,113,974, valued at $3,499,551 in 1930. Imports of aromatic chemicals for the year, it is shown, totaled 69,737 pounds, valued at $105,437 against 129,658, valued at $190,353; receipts of medicinals, photographic developers, intermediate and other coal tar products were 1,692,590 pounds, valued at $745,995 against 1,948,235, valued at $686,566, and imports of color lakes were 9,309 pounds, no 1930 figures being given for comparison.

Glycerine — Demand for the c. p. grade was slightly better but the unseasonal weather has retarded the normal flow of goods into consumer channels. The soap lye grade was reduced slightly but appeared as the month closed to be quite firm at the new levels. Imports of crude glycerine into U. S. during October, 1931, advanced moderately, totaling 1,053,544 pounds, worth $50,376, as compared with 800,011 pounds, valued at $39,286, in the previous month. Imports of refined glycerine were also higher in October, standing at 83,505 pounds, worth $6,143, as against 50,891 pounds worth $3,853, in the previous month. The following figures give in pounds the imports of glycerine into the United States over a period of years:

	Refined	*Crude*
1923	585,792	14,548,660
1924	1,500,644	14,427,054
1925	2,043,606	19,264,654
1926	10,839,093	27,658,552
1927	8,288,574	14,943,670
1928	4,217,943	4,951,651
1929	5,381,684	14,951,901
1930	3,136,809	12,144,193
Jan.-Oct., 1931	951,917	8,833,848

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Dimethylsulfate, 100 lb drs...lb.	.45	.50	.45	.50	.50	.45	50	.45
Dinitrobenzene, 400 lb bbls...lb.	.15	.16	.15	.16½	.16½	.15½	16½	.15
Dintrochlorobenzene, 400 lb bbls...lb.	.13	.15	.13	.15	.15	.13	.15	.13
Dinitronaphthalene, 350 lb bbls...lb.	.34	.37	.34	.37	.37	.34	.37	.34
Dinitrophenol. 350 lb bbls....lb.	.23	.24	.29	.30	.32	.31	.32	.31
Dinitrotoluene, 300 lb bbls...lb.	.16	.17	.16	.17	.18	.16	.19	.17
Diorthotolyguanidine, 275 lb bbls wks...lb.	.42	.46	.42	.46	.46	.42	.49	.42
Dioxan (See Diethylene Oxide)	.....	.....	.....	.....	...	.....	.....	.....
Diphenyl...lb.	.20	.40	.20	.40	.50	.20	.50	.40
Diphenylamine...lb.	.34	.37	.37	.38	.40	.38	.47	.40
Diphenylguanidine, 100 lb bbl lb.	.30	.35	.30	.35	.35	.30	.40	.30
Dip Oil, 25%, drums...lb.	.26	.30	.26	.30	.30	.26	.30	.26
Divi Divi pods, bgs shipmt..ton	29.00	30.00	28.00	35.00	46.50	35.00	57.00	46.50
Extract...lb.	.05	05½	.05	.05½	.05½	.05	.05½	.05
Egg Yolk, 200 lb cases...lb.	.51	.52	.45	.58	.80	.72	.84	.77
Epsom Salt, tech, 300 lb bbls c-1 NY...100 lb.	1.70	1.90	1.70	1.90	1.90	1.70	1.90	1.70
Ether, USP anaesthesia 55 lb. drs...lb.	.....	.23	.23	.28	.28	.21	.39	.38
USP (Conc.)...lb.	.09	.10	.09	.10	.....	.....	.....	.....
Ethyl Acetate, 85% Ester, ... tanks...lb.	.....	.09	.06½	.09	.115	.085	.122	.108
drums...lb.	.....	.10	.08	.10	.158	.094	.129	.111
Anhydrous, tanks...lb.	.....	.10	.075	.119	.142	.119		
drums...lb.	.....	.10½	.085	.121	.156	.115		
Acetoacetate, 50 gal drs...lb.	.65	.68	.65	.68	.68	.65	.68	.65
Benzylaniline, 300 lb drs...lb.	.88	.90	.88	.90	1.11	.88	1.11	1.05
Bromide, tech, drums...lb.	.50	.55	.50	.55	.55	.50	.55	.50
Carbonate, 90%, 50 gal drs gal.	1.85	1.90	1.85	1.90	1.90	1.85	1.90	1.85
Chloride, 200 lb. drums...lb.	.....	.22	.....	.22	.22	.22	.22	.22
Chlorocarbonate, cbys...lb.	.....	.30	.....	.30	.40	.30	.40	.35
Ether, Absolute, 50 gal drs..lb.	.50	.52	.50	.52	.52	.50	.52	.50
Furoate, 1 lb tins...lb.	.....	5.00	.....	5.00	5.00	5.00	5.00	5.00
Lactate, drums works...lb.	.25	.29	.25	.29	.29	.25	.35	.25
Methyl Ketone, 50 gal drs..lb.	.....	.30	.....	.30	.30	.30	.30	.30
Oxalate, drums works...lb.	.45	.55	.45	.55	.55	.45	.55	.45
Oxybutyrate, 50 gal drs wks.lb.	.....	.30½	.....	.30½	.30½	.30½	.36	.30
Ethylene Dibromide, 60 lb dr .lb.	.....	.70	.....	.70	.70	.70	.70	.79
Chlorhydrin, 40%, 10 gal cbys. chloro. cont...lb.	.75	.85	.75	.85	.85	.75	.85	.75
Dichloride, 50 gal drums...lb.	.05	.07	.05	.07	.07	.05	.10	.05
Glycol, 50 gal drs wks...lb.	.25	.28	.25	.28	.28	.25	30	.25
Mono Butyl Ether drs wks.	.....	.24	.24	.27	.27	.23	.31	.23
Mono Ethyl Ether drs wks	.17	.20	.17	.20	.20	.16	.24	.16
Mono Ethyl Ether Acetate dr. wks...	.19½	.23	.19½	.23	.23	.19	.26	.19
Mono Methyl Ether, drs.lb.	.21	.23	.21	.23	.23	.19	.23	19
Stearate...	.18	.18	.18	.18	.....	.....	.....	.....
Oxide, cyl...lb.	.....	2.00	....	2.00	2 00	2.00		
Ethylidenaniline...lb.	.45	.47½	.45	.47½	.47½	.45	.65	45
Feldspar, bulk...ton	15.00	20.00	15.00	20.00	25.00	¹5.00	25.00	20.00
Powdered, bulk works...ton	15.00	21.00	15.00	21.00	21.00	15.00	21.00	15.00
Ferric Chloride, tech, crystal 475 lb bbls...lb.	.05	.07½	.05	.07½	.07½	.05	.09	.05
Fish Scrap, dried, wks...unit	.....	3.00&10	3.00&10	4.25&10	4.35&10	3.90&10	4.25&10	3.65&10
Acid, Bulk 7 & 3½% delivered Norfolk & Balt. basis...unit	.....	2.40&50	.....	2.40&50	3.50&50	3.20&50	4.00&50	3.50&50
Fluorspar, 98%, bags...	41.00	46.00	41.00	46.00	46.00	41.00	46.00	41.00

Formaldehyde

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Formaldehyde, aniline, 100 lb. drums...lb.	.37½	.42	.37½	.42	.42	.37½	.42	.37
USP, 400 lb bbls wks...lb.	.06	.07¾	.06	.07¾	.08	.06	.10	.08½
Fossil Flour...lb.	.02½	.04	.02½	.04	.04	.02½	.04	.02½
Fullers Earth, bulk, mines..ton	15.00	20.00	15.00	20.00	20.00	15.00	20.00	15.00½
Imp. powd c-1 bags...ton	24.00	30.00	24.00	30.00	30.00	24.00	30.00	25.00
Furfural (tech.) drums, wks..lb.	.....	.10	.....	.10	.15	.10	.19½	.17
Furfuramide (tech) 100 lb dr..lb.	.....	.30	.....	.30	.30	.30	.30	.30
Furfuryl Acetate, 1 lb tins...lb.	.....	5.00	.....	5.00	5.00	5.00	5.00	5.00
Alcohol, (tech) 100 lb dr...lb.	.....	.50	.....	.50	.50	.50	.50	.50
Furoic Acid (tech) 100 lb dr...lb.	.....	.50	.....	.50	.50	.50	1.00	.50
Fusel Oil, 10% impurities...gal.	.. ..	1.35	.....	1.35	1.35	1.35	1.35	1.35
Fustic, chips...lb.	.04	.05	.04	.05	.05	.04	.05	.04
Crystals, 100 lb boxes...lb.	.18	.20	.18	.22	.22	.20	.22	.20
Liquid, 50°, 600 lb bbls...lb.	.07	.08	.07	.10	.10	.09	.10	.09
Solid, 50 lb boxes...lb.	.14	.16	.14	.16	.16	.14	.16	.14
Sticks...ton	25.00	26.00	25.00	26.00	26.00	25.00	26.00	25.00
G Salt paste, 360 lb bbls...lb.	.45	.50	.45	.50	.50	.45	.52	.45
Gall Extract...lb.	.18	.20	.18	.20	.20	.18	.21	.18
Gambier, common 200 lb cs...lb.	.....	.07	.06½	.07	.07	.06	.07	06
25% liquid, 450 lb bbls...lb.	.08	.10	.08	.10	.10	.08	.14	.08
Singapore cubes, 150 lb bg..lb.	.09½	.09	.09½	.09	.09	.08½	.09	.08½
Gelatin, tech, 100 lb cases...lb.	.45	.50	.45	.50	.50	.45	.50	.45
Glauber's Salt, tech, c-1 wks...100 lb.	1.00	1.70	1.00	1.70	1.70	1.00	1.70	.70
Glucose (grape sugar) dry 70-80° bags c-1 NY...100 lb.	3.24	3.34	3.24	3.34	3.34	3.24	3.34	3.20
Tanner's Special, 100 lb bags...100 lb.	.....	3.14	.....	3.14	3.14	3.14	3.14	3.14
Glue, medium white, bbls...lb.	.16	.20	.16	.24	.24	.20	.24	.20
Pure white, bbls...lb.	.20	.25	.20	.26	.26	.22	.26	.22
Glycerin, CP, 550 lb drs...lb.	.11¼	.11½	.11¼	.14½	.14½	.12½	.16	.13½
Dynamite, 100 lb drs... lb.	.09	.09¾	.09	.12¼	.12¼	.11	.12½	.10½
Saponification, tanks...lb.	.06	.06¼	.06	.07½	.08	07½	.08½	.07½
Soap Lye, tanks...lb.	.04¾	.05	.04¾	.07	.07½	.06¾	.07½	.06¾
Graphite, crude, 220 lb bgs...ton	15.00	35.00	15.00	35.00	35.00	15.00	35.00	15.00
Flake, 500 lb bbls...lb.	.06	09	.06	.09	.09	.06	.09	06

Gums

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Gum Accroides, Red, coarse and fine 140-150 lb bags...lb.	.03¾	.04½	.03¾	.04½	.04½	.03¾	.04½	.03
Powd, 150 lb bags...lb.	.06	.06½	.06	.06½	.06½	.06	.06½	.06¾

Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1931 Average $1.404 - Jan. 1931 $1.283 - Jan. 1932 $1.54

Naval Stores — Prices in most grades closed the month slightly higher when comparison is made with the end of last month. Nevertheless, the industry is passing through a very critical period and real constructive efforts in the next season beginning April 1 must be made to prevent further chaotic conditions. Turpentine was much firmer in both the local and primary markets.

Paint Materials — Despite the general decline in tonnages in practically every industrial chemical some improvements were reported in exports, notably in lithopone, carbon black, and nitrocellulose lacquers. Statistics below indicate the exports of the items showing increases for the 11 months of 1931 as compared with the same period in 1930:

	1930 Quantity	*1930* Value
Lithopone (lb.)	6,876,109	$358,654
Carbon black (lb.)	76,875,683	5,341,424
Paste paint (lb.)	1,669,434	333,789
Nitrocellulose (pyroxylin) lacquers—		
Pigmented (gal.)	244,242	824,546
Clear (gal.)	69,401	143,412
	85,734,869	7,001,825

	1931 Quantity	*1931* Value
Lithopone (lb.)	7,177,959	$320,286
Carbon black (lb.)	88,028,311	4,656,709
Paste paint (lb.)	3,816,165	494,760
Nitrocellulose (pyroxylin) lacquers—		
Pigmented (gal.)	311,099	891,585
Clear (gal.)	89,260	187,877
	99,422,794	6,551,217

Phosphate Rock — Preliminary compilations on the raw phosphate rock industry in 1931 indicate substantial declines in both mine production and shipments. Figures compiled from preliminary reports of producers in the United States in 1931 show a decrease of 35% in mine production, as compared with 1930. Shipments of phosphate rock in 1931 show decreases of about 36% in quantity and 35% in value, while total stocks increased about 27%. The quantity of phosphate rock mined in the U. S. in 1931 was approximately 2,563,300 long tons, compared with 3,951,353 tons in 1930. Total shipments of phosphate rock in 1931 were approximately 2,492,500 long tons, valued at $9,085,643, as compared with 3,926,392 long tons, valued at $13,996,830 in 1930. Total stocks on hand Dec. 31, 1931, amounted to about 1,229,100 long tons, as compared with 968,745 tons on hand Dec. 31, 1930.

Total shipments of phosphate rock in Florida in 1931 decreased 38% in quantity and 35% in value. Hard rock shipments showed decreases of 30% in quantity and 28% in value. In comparison with 1930, decreases of 38% in quantity and 35% in

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Yellow, 150-200 lb bags....lb.	.18	.20	.18	.20	.20	.18	.20	.18
Animi (Zanzibar) bean & pea 250 lb cases............lb.	.35	.40	.35	.40	.40	.35	.40	.35
Glassy, 250 lb cases.......lb.	.50	.55	.50	.55	.55	.50	.55	.50
Asphaltum, Barbadoes (Manjak) 200 lb bags............lb.	.04½	.06	.04½	.12	.12	.09	.12	.09
Egyptian, 200 lb cases.......lb.	.13	.15	.13	.17	.17	.15	.17	.15
Gilsonite Selects, 200 lb bags ....ton	30.50	32.90	30.50	32.90	32.90	30.50	32.90	30.50
Damar Batavia standard 136, lb cases..................lb.	.08½	.09	.08½	.13	.20	.14	.26	.22
Batavia Dust, 160 lb bags.....lb.	.05	.05½	.05½	.06	.11	.06	.11	.10½
E Seeds, 136 lb cases.......lb.	.06	.06½	.07	.08	.13	.08	.17½	.15
F Splinters, 136 lb cases and bags.................lb.	.05½	.06	.06½	.07½	.13½	.07	.13½	.13
Singapore, No 1, 224 lb cases lb.	.10½	.11	.10½	.15	.24	.18½	.30½	.26
No. 2, 224 lb cases........lb.	.07	.07½	.07	.10	.20½	.13	.24	.21½
No. 3, 180 lb bags........lb.	.04½	.05	.05	.06	.11½	.07	.14	.10
Benzoin Sumatra, U. S. P. 120 lb cases.................lb.	.21	.22	.23	.34	.40	.33	.40	.38
Copal Congo, 112 lb bags, clean opaque...............lb.	.16½	.17	.16	.17	.17	.16	.17	.14
Dark, amber.............lb.	.06	.07	.06½	.07½	.08	.07½	.09	.08½
Light, amber............lb.	.08	.10	.08	.14	.14	.12½	.14	.12½
Water white.............lb.	.37	.45	.37	.45	.45	.37	.36	.35
Mastic.....................lb.	.42	.44	.42	.58	.65	.57	.65	.58
Manila, 180-190 lb baskets								
Loba A..................lb.	.10	.11	.11	.13	.17½	.13	.17½	.17
Loba B..................lb.	.08	.08½	.09	.10½	.16½	.13½	.16½	.15½
Loba C..................lb.	.07½	.08	.08½	.10	.14	.10	.14½	.13½
M A Sorts...............lb.	.04¾	.05	.04¾	.06½	.....	.....	.....	.....
D B B Chips.............lb.	.05¼	.06½	.05¼	.08	.....	.....	.....	.....
East Indies chips, 180 lb bags lb.	.05	.05½	.05	,05½	.11	.09	.11	.10
Pale bold, 224 lb cs......lb.	.15½	.16	.15½	.16	.21	.17½	.21	.20
Pale nubs, 180 lb bags....lb,	.08	.08½	.08	.09	.16	.12½	.16	15
Pontianak, 224 lb cases....								
Bold gen No 1.........lb.	.15½	.16	.16	.17	.21	.19	.23	.20
Gen chips spot.........lb.	.07	.08	.07	.08½	.15	.13½	.15	.14½
Elemi, No. 1, 80-85 lb cs...lb.	.09	.09½	.10	.12	.14	.12½	.14	.13½
No. 2, 80-85 lb cases.....lb.	.08½	.09	.09½	.11½	.13½	.12	.13½	.13
No. 3, 80-85 lb cases.....lb.	.08	.08½	.08½	.11	.13	.11	.13	.12
Kauri, 224-226 lb cases No. 1	.43	.46	.42	.50	.57	.48	.57	.50
No. 2 fair pale..........lb.	.28	.30	.24	.29	.38	.32	.38	.35
Brown Chips, 224-226 lb cases...............lb.	.10	.12	.10	.12	.12	.10	.12	.10
Bush Chips, 224-226 lb. cases...............lb.	.26	.28	.28	.34	.40	.38	.40	.38
Pale Chips, 224-226 lb cases ....lb.	.19	21	.19	.22	.26	.24½	.26	.24½
Sandarac, prime quality, 200 lb bags & 300 lb casks...lb.	.....	.20	.18	.22	.40	.27	.72	.35
Helium, 1 lit. bot. ....lit.	.....	25.00	.....	25.00	25.00	25.00	.20	.17
Hematine crystals, 400 lb bbls lb.	.14	.18	.14	.18	.18	.14	.20	.14
Paste, 500 bbls...........lb.	.....	.11	.....	.11	.11	.11	.11	.11
Hemlock 25%, 600 lb bbls wks lb.	.03	.03½	.03	.03½	.03½	.03	.03½	.03
Bark.....................ton	.....	16.00	.....	16.00	16.00	16.00	17.00	16.00
Hexalene, 50 gal drs wks......lb.	.40	.50	.40	.60	.60	.60	.60	.60
Hexamethylenetetramine, drs.lb.	.46	.47	.46	.50	.50	.46	.58	.48
Hoof Meal, fob Chicago....unit	.....	1.35	1.35	2.50	3.75	2.50	4.00	3.75
South Amer. to arrive....unit	.....	1.80	1.80	2.70	3.75	2.70	3.90	3.75
Hydrogen Peroxide, 100 vol, 140 lb cbys................lb.	.21	.24	.21	.24	.26	.21	.26	.24
Hydroxyamine Hydrochloride lb.	.....	3.15	.....	3.15	3.15	3.15		
Hypernic, 51°, 600 lb bbls....lb.	.11	.12	.11	.15	.15	.12	.15	.12
Indigo Madras, bbls.........lb.	1.25	1.30	1.25	1.30	1.30	1.28	1.30	1.28
20% paste, drums.........lb.	.15	.18	.15	.18	.18	.15	.18	.15
Synthetic, liquid..........lb.	.....	.12	.....	.12	.12	.12	.12	.12
Iron Chloride, see Ferric or Ferrous								
Iron Nitrate, kegs...........lb.	.09	.10	.09	.10	.10	.09	.10	.09
Coml, bbls..........100 lb.	2.50	3.25	2.50	3.25	3.25	2.50	3.25	2.50
Oxide, English..........lb.	.10	.12	.10	.12	.12	.10	.12	.10
Red, Spanish...........lb.	.02½	.03½	.02½	.03½	.03½	.02½	.03½	.02½
Isopropyl Acetate, 50 gal drs gal.	.85	.90	.85	.90	.90	.85	.90	.85
Japan Wax, 224 lb cases......lb.	.08¾	.09	.07¾	.11	.15½	.11½	.18	.16
Kieselguhr, 95 lb bgs NY....... Brown..................ton	60.00	70.00	60.00	70.00	70.00	60.00	70.00	60.00
Lead Acetate, bbls wks...100 lb.	9.50	10.00	9.50	11.00	13.50	10.50	13.50	13.00
White crystals, 500 lb bbls wks...............100 lb.	10.50	11.00	10.50	12.25	14.50	11.50	14.50	14.00
Arsenate, drs 1c-1 wks.....lb.	.10	.13	.10	.14	.16	.13	.15	.13
Dithiofuroate, 100 lb dr....lb.	.....	1.00	.....	1.00	1.00	1.00		
Metal, c-1 NY........100 lb.	.....	3.75	3.75	4.60	7.75	5.10	7.75	6.10
Nitrate, 500 lb bbls wks....lb.	.12	.14	.12	.14	.14	.13	.14	.14
Oleate, bbls...............lb.	.17½	.18	.17½	.18	.18	.17½	.18	.17½
Oxide Litharge, 500 lb bbls.lb.	.06½	.07	.06½	.08	.08½	.08½	.08½	.08½
Red, 500 lb bbls wks....lb.	.06¾	.07	.06¾	.08½	.09½	.08½	.09½	.09½
White, 500 lb bbls wks...lb.	.06½	.07	.06½	.08	.09½	.07½	.09½	.09
Sulfate, 500 lb bbls wk...lb.	.05¾	.06	.05¾	.07	.08¾	.06¾	.08½	.08½
Leuna saltpetre, bags c.i.f. ..ton	.....	Nom.	.....	57.60	57.60	57.60	57.00	52.00
S. points c. i. f............ton	.....	Nom.	.....	57.90	57.90	57.90	57.30	52.30
Lime, ground stone bags.....ton	.....	4.50	.....	4.50	4.50	4.50	4.50	4.50
Live, 325 lb bbls wks...100 lb.	.....	1.05	.....	1.05	1.05	1.05	1.05	1.05
Lime Salts, see Calcium Salts								
Lime-Sulfur soln bbls........gal.	.15	.17	.15	.17	.17	.15	.17	.15
Lithopone, 400 lb bbls 1c-1 wks ....lb.	.04½	.05	.04½	.05	.05½	.04½	.06½	.05½
Logwood, 51°, 600 lb bbls.....lb.	.07	.08	.07	.08	.08½	.07	.08½	.08½
Chips, 150 lb bags.........lb.	.03	.03½	.03	.03½	.03½	.03	.03½	.03
Solid, 50 lb boxes.........lb.	.12	.12½	.12	.12½	.12½	.12½	.12½	.12½
Sticks....................ton	24.00	26.00	24.00	26.00	26.00	24.00	26.00	24.00
Lower grades............lb.	.07½	.08	.07½	.08	.08	.07½	.08	.07½
Madder, Dutch.............lb.	.22	.25	.22	.25	.25	.22	.25	.22
Magnesite, calc, 500 lb bbl...ton	50.00	60.00	50.00	60.00	60.00	50.00	60.00	50.00

Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1931 Average $1.404 - Jan. 1931 $1.283 - Jan. 1932 $1.54

value were recorded in landpebble shipments. Stocks of phosphate rock on hand Dec. 31, 1931, were about 997,000 tons, as compared with 798,000 tons on Dec. 31, 1930. Practically all phosphate rock mined in Tennessee in 1931 was brown rock. The total production in Tennessee (brown and blue rock) was 363,453 long tons, as compared with 618,341 tons in 1930. Shipments were reported to be 344,677 long tons, valued at $1,558,858, as compared with 611,045 long tons, valued at $2,938, 525 in 1930. These figures indicate decreases of 44% in quantity and 47% in value, as compared with 1930. Total imports of crude phosphate rock into the U. S. for the first eleven months of 1931, amounted to 13,570 long tons, valued at $163,840, 96% of which were reported to have come from French Oceania. (These figures are subject to revision). Total exports of crude phosphate rock for the first eleven months of 1931 were reported to be 897,890 long tons, valued at $4,034,459. They consisted of 92,030 long tons of hard rock, valued at $534,534, and 805,860 long tons of landpebble rock, valued at $3,499,925. Tunisian phosphate rock production in October, 1931, showed a slight recovery and reached 182,000 metric tons, while exports showed a slight gain over August and September and attained 155,000 tons. The total tonnage exported during the first 10 months of 1931 reached 1,546,000 (against 1,895,000 tons extracted), a very low figure when compared with the 2,229, 000 tons exported (2,748,000 produced) in the same period of 1930.*

Caustic Potash — Both importers and domestic producers reported an improvement in tonnages in the weeks immediately following the turn of the year but as the month closed some sluggishness was apparent. Imports of caustic potash into the U. S. averaged 4,260 short tons annually in the period 1910-1914. From over 5,000 tons in 1921 imports increased to 7,821 tons in 1929, the maximum in any year during the entire period 1909 to 1930. In the first 11 months of 1930 and 1931, a considerable decline is shown, respectively, to 4,234 and 4,040 short tons.

Shellac — Unsteady conditions in primary markets prevented prices from going lower. In the local market, however, consumers appeared to be well stocked and shipments were below the normal demand for this time of the year. How far imports have declined from the high of 1929 is shown by the following estimate of shipments given the trade.

*Bureau of Mines

	Current Market		1931		1930		1929	
			Low	High	High	Low	High	Low
Magnesium								
Magnesium Carb, tech, 70 lb bags NY....lb.	06	06½	.06	.06½	.06½	.06	.06½	.06
Chloride flake, 375 lb. drs c-l wks....ton	35.00	36.00	35.00	36.00	36.00	36.00	36.00	36.00
Imported shipment....ton	31.75	33.00	31.75	33.00	33.00	31.75	33.00	33.00
Fused, imp, 900 lb bbls NY ton	.....	31.00	.....	31.00	31.00	31.00	31.00	31.00
Fluosilicate, crys, 400 lb bbls wks....lb.	.10	.10½	.10	.10½	.10½	.10	.10½	.10
Oxide, USP, light, 100 lb bbls....lb.	.....	.42	.....	.42	.42	.42	.42	.42
Heavy, 250 lb bbls....lb.	.. ..	.50	.....	.50	.50	.50	.50	.50
Peroxide, 100 lb cs....lb.	1.00	1.25	1.00	1.25	1.25	1.00	1.25	1.00
Silicofluoride, bbls....lb.	.09¾	.10¼	.09¾	.10¼	.10¼	.09¾	.10¼	.09¾
Stearate, bbls....lb.	.24	.26	.24	.26	.26	.25	.26	.25
Manganese Borate, 30%, 200 lb bbls....lb.	.....	.19	.....	.19	.19	.19	.24	.19
Chloride, 600 lb casks....lb.	.07½	.08½	.07½	.08½	.08½	.07½	.08½	.08
Dioxide, tech (peroxide) drs lb.	.03½	.06	.03½	.06	.06	.03½	.06	.04½
Ore, Powdered or granular.. 75-80%, bbls....lb.	.02½	.03	.02½	.03	.03	.02½	.03½	.02½
80-85%, bbls....lb.	.....	.03½	.....	.03½	.03½	.03½	.04½	.03½
85-88%, bbls....lb.	.04	.04½	.04	.04½	.04½	.04	.05½	.04
Sulfate, 550 lb drs NY....lb.	.07	.08	.07	.08	.08	.07	.08½	.07
Mangrove 55%, 400 lb bbls...lb.	.....	.04	.03½	.04	Nom.	.03½	Nom.	.03½
Bark, African....ton	.....	25.00	23.00	29.75	33.00	29.75	35.00	30.00
Marble Flour, bulk....ton	14.00	15.00	14.00	15.00	15.00	14.00	15.00	14.00
Mercurous chloride....lb.	.....	.93	.93	2.05	2.05	2.05	2.05	2.05
Mercury metal.... 76 lb flask	65.00	68.00	64.00	106.00	124.50	106.00	126.00	120.00
Meta-nitro-aniline....lb.	.67	.69	.67	.69	.69	.67	.74	.67
Meta-nitro-para-toluidine 200 lb. bbls....lb.	1.40	1.55	1.40	1.55	1.55	1.50	1.55	1.50
Meta-phenylene-diamine 300 lb. bbls....lb.	.80	.84	.80	.84	.84	.80	.90	.80
Meta-toluene-diamine, 300 lb bbls....lb.	.67	.69	.67	.69	69	.67	.72	.67
Methanol								
Methanol, (Wood Alcohol),.... 95%....gal.	.33	.35	.33	.37	.48	.35	.65	.51
97%....gal.	.34	.39	.34	.43	.49	.39	.65	.53
Pure, Synthetic drums cars gal.	.39½	.41½	.39½	.42½	.50	.42½	.68	.53
Synthetic tanks....gal.	.....	.35½	.35½	.40½	.50	.40½	.66	.54
Methyl Acetate, drums....gal.	.. ..	Nom.	.....	Nom.	Nom.	Nom.	.95	.95
Acetone,....gal.	.50	.55	50	.70	.77	.65	.85	.73
Anthraquinone,....lb.	.85	.95	.85	.95	.85	.70	.95	.85
Cellosolve, (See Ethylene Glycol Mono Methyl Ether)	.....	.....	.....	.....	.....	.....	.....	....
Chloride, 90 lb cyl....lb.	.45	.45	.45	.45	.45	.45	.60	.45
Furoate, tech., 50 gal. dr., .lb.	.....	.50	.....	.50	.50	.50	.50	.50
Mica, dry grd. bags wks....lb.	65.00	80.00	65.00	80.00	80.00	65.00	80.00	65.00
Wet, ground, bags wks....lb.	110.00	115.00	110.00	115.00	115.00	110.00	115.00	110.00
Michler's Ketone, kegs....lb.	.....	3.00	.....	3.00	3.00	3.00	3.00	3.00
Monochlorobenzene, drums see, Chorobenzene, mono....lb.								
Monomethylparaminosufate 100 lb drums....lb.	3.75	4.00	3.75	4.00	4.00	3.75	4.20	3.75
Montan Wax, crude, bags....lb.	.05½	.07	.05½	.07	.07	.06	.07	.06½
Myrobalans 25%, liq bbls....b	.03¾	.04¼	.03¾	.04¼	.04¼	.03¾	.04¼	.03¾
50% Solid, 50 lb boxes....lb.	.05	.05½	.05	.05½	.05½	.05	.08½	.05
J1 bags....ton	34.00	35.00	34.00	35.00	41.00	34.00	43.00	40.00
J 2 bags....ton	15.50	16.50	15.50	22.50	26.50	19.75	40.00	26.50
R 2 bags....ton	15.50	16.00	16.00	20.00	27.50	19.00	34.00	27.50
Naphtha, v. m. & p. (deodorized) bbls....gal.	.12	.14	.12	.18	.16	.16	.18	.16
Naphthalene balls, 250 lb bbls wks....lb.	.03¾	.04¾	.03¾	.04¾	.05½	.03¾	.05½	.05½
Crushed, chipped bgs wks..lb.	.....	.04	.....	.04	.04½	.04	.04½	.04½
Flakes, 175 lb bbls wks....lb.	.....	.03¾	.....	.03¾	.05	.03¾	.05	.05
Nickel Chloride, bbls kegs....lb.	.18	.20	.18	.21	.21	.20	.24	.20
Oxide, 100 lb kegs NY....lb.	.37	.40	.37	.40	.40	.37	.40	.37
Salt bbl. 400 bbls lb NY...lb.	.10½	.13	.10½	.13	.13	.10½	.13	.13
Single, 400 lb bbls NY....lb.	.10½	.12	.10½	.12	.13	.10½	.13	.13
Metal ingot....lb.	.35	.35	.35	.....	.....	.....	.....	.....
Nicotine, free 40%, 8 lb tins, cases....lb.	1.25	1.30	1.25	1.30	1.30	1.25	1.30	1.25
Sulfate, 10 lb tins....lb.	.98½	1.20	.98½	1.20	1.20	.98½	1.20	.98½
Nitre Cake, bulk....ton	11.00	12.00	12.00	14.00	18.00	12.00	18.00	12.00
Nitrobenzene, redistilled, 1000 lb drs wks....lb.	.09	.09½	.09	.09½	.09½	.09	.10½	.09
Nitrocellulose, c-l-l-cl, wks...lb.	.25	.36	.25	.36	.36	.25	.36	.25
Nitrogenous Material, bulk..unit	1.50	1.55	1.50	2.70	3.40	2.50	4.00	3.40
Nitronaphthalene, 550 lb bbls.lb.	.....	.25	.....	.25	.25	.25	.25	.25
Nitrotoluene, 1000 lb drs wks.lb.	.14	.15	.14	.15	.15	.14	.15	.14
Nutgalls Aleppy, bags....lb.	.....	.18	.16	.18	.16½	.16	.16½	.16
Chinese, bags....lb.	.17	.18	.17	.18	.13	.12	.13	.12
Oak Bark, ground....ton	30.00	35.00	30.00	35.00	35.00	30.00	50.00	30.00
Whole....ton	20.00	23.00	20.00	23.00	23.00	20.00	23.00	20.00
Orange-Mineral, 1100 lb casks NY....lb.	.10½	.13	.10½	.13	.13	.11¾	.13½	.11¾
Orthoaminophenol, 50 lb kgs..lb.	2.15	2.25	2.15	2.25	2.25	2.15	2.25	2.15
Orthoanisidine, 100 lb drs....lb.	2.50	2.60	2.50	2.60	2.60	2.50	2.60	2.50
Orthochlorophenol, drums....lb.	.50	.65	.50	.65	65	.50	.65	.50
Orthocresol, drums....lb.	.18	.22	.18	.25	.35	.18	.28	.18
Orthodichlorobenzene, 1000 lb drums....lb.	.07	.10	.07	.10	.10	.07	.10	.07
Orthonitrochlorobenzene, 1200 lb drs wks....lb.	.28	.29	.28	.33	.33	.30	.33	.30
Orthonitrotoluene, 1000 lb drs wk....lb.	.16	.18	.16	.18	.18	.16	.18	.16
Orthonitrophenol, 350 lb dr...lb.	.85	.90	.85	.90	90	.85	.90	.85
Orthotoluidine, 350 lb bbl 1c-1 lb.	.20	.22	.25	30	.30	.25	.30	.25

Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1931 Average $1.404 - Jan. 1931 $1.283 - Jan. 1932 $1.54

	Original pkgs. 1931	1930	1929
U. S.—			
orange	66,400	93,600	159,100
garnet	1,200	4,900	10,900
button	500	1,300	2,100
seedlac	51,400	51,600	33,600
Totals	119,500	151,400	205,700
United Kingdom	70,800	76,100	89,100
Continent	51,800	74,200	63,900
Total	242,100	301,700	358,700

Sodium Bichromate — The market has stabilized very firmly at the 5c level for large contracts and diligent inquiry among manufacturers and consumers failed to disclose prices lower than this figure. Bichromate is now selling near the 1914 price level. When the prices of lime, chrome, ore, and labor are taken into account the price is considerably below that level. While manufacturing processes have undoubtedly been improved in the interim and the importance of the item of labor reduced, nevertheless, manufacturing costs must be perilously close to the sales figure. British makers of bichromates have now fixed the prices for delivery from Jan. to March 31, 1932, when they will again come up for revision, as follows: bichromate of soda, 4d. per lb.; bichromate of potash, 5d. per lb., with the following percentage discounts for contract quantities: For 1¼ tons and less than 3 tons, 1; for 3 tons and less than 12½ tons, 2; for 12½ tons and less than 25 tons, 2½; for 25 tons and less than 125 tons, 3½. The spot prices are the same as the contract prices, but there will be no discount allowed, and in any case the rebates mentioned will only be payable at the end of 1932.

Sodium Nitrate — Shipments are reported as being heavy from Chile but actual tonnage being moved as the month closed appeared to be very small for this time of the year. Prices were unaltered. Private U. S. plants, according to Mr. Brand, secretary, National Fertilizer Association testifying recently in Washington before the House Committee on Military Affairs have a synthetic nitrate capacity of 318,700 tons of nitrogen annually. This capacity can be stepped up to 450,000 tons by diverting methanol capacity to nitrogen capacity and adding on 90,000 tons additional for the new unit at Hopewell. The American Cyanamid plant at Niagara Falls can produce 75,000 tons and the Consolidated Mining Co. plant at Trail in British Columbia 17,500 tons. In addition, there are now approximately 200,000 tons of nitrogen derived from by-products. Mr. Brand estimated that the accumulated surplus of nitrogen on Jan. 1, 1932 was in the neighborhood of 114,000 tons. It is difficult to see North America absorb-

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Orthonitroparachlorphenol, tins ...lb.	.70	.75	.70	.75	.75	.70	.75	.70
Osage Orange, crystals ...lb.	.16	.17	.16	.17	.17	.16	.17	.16
51 deg. liquid ...lb.	.07	.07½	.07	.07½	.07½	.07	.07½	.07
Powdered, 100 lb bags ...lb.	.14½	.15	.14½	.15	.15	.14½	.15	.14½
Paraffin, refd, 200 lb cs slabs								
123-127 deg. M. P. ...lb.	.....	.03	.03½	.03	.04⅞	.03½	.06½	.04½
128-132 deg. M. P. ...lb.	.....	.03½	.03½	.03½	.06⅜	.03½	.07	.04½
133-137 deg. M. P. ...lb	.....	.04¾	.04⅜	.04¾	.07½	.04⅜	.07½	.06¼
Para Aldehyde, 110-55 gal drs. .lb.	.20½	.23	.20½	.23	.23	.20½	.28	.20½
Aminoacetanilid, 100 lb bg. .lb.	.52	.60	.52	.60	1.05	.52	1.05	1.00
Aminohydrochloride, 100 lb kegs ...lb	1.25	1.30	1.25	1.30	1.30	1.25	1.30	1.25
Aminophenol, 100 lb kegs. .lb.	.78	.80	.82	.86	1.02	.92	1.15	.99
Chlorophenol, drums ...lb.	.50	.65	.50	.65	.65	.50	.65	.50
Coumarone, 330 lb drums. lb.	.....	.....	.....	.....	.....	.....	.....	.....
Cymene, refd, 110 gal dr. .gal.	2.25	2.50	2.25	2.50	2.50	2.25	2.50	2.25
Dichlorobenzene, 150 lb bbls wks ...lb.	.15½	.16	.15½	.20	.20	.17	.20	.17
Nitroacetanilid, 300 lb bbls. lb.	.45	.52	.45	.55	.55	.50	.55	.50
Nitroaniline, 300 lb bbls wks ...lb.	.48	.55	.48	.55	.55	.48	.55	.48
Nitrochlorobenzene, 1200 lb drs wks ...lb.	.23	26	.23	.26	.26	.23	.26	23
Nitro-orthotoluidine, 300 lb bbls ...lb.	2.75	2.85	2.75	2.85	2.85	2.75	2.85	2.75
Nitrophenol 185 lb bbls ...lb.	.45	50	.45	.50	.50	.45	.55	.45
Nitrosodimethylaniline, 120 lb. bbls ...lb.	.92	.94	.92	.94	.94	.92	.94	.92
Nitrotoluene, 350 lb bbls ...lb.	.29	.31	.29	.31	.31	.29	.31	.29
Phenylenediamine, 350 lb bbls ...lb.	1.15	1.20	1.15	1.20	1.20	1.15	1.20	1.15
Tolueneulfonamide, 175 lb bbls ...lb.	.70	.75	.70	.75	.75	.70	.75	.70
Toluenesulfonchloride, 410 lb bbls wks ...lb.	.20	.22	.20	.22	.22	.20	.22	.20
Toluidine, 350 lb bbls wk ...lb.	.42	.43	.40	.44	.40	.38	.42	.38
Paris Green, Arsenic Basis								
100 lb kegs ...lb.	.....	.27	.....	.27	.27	.27	.27	25
250 lb kegs ...lb.	.....	.26	.25	.26	.25	.25	.25	.23
Persian Berry Ext., bbls ...lb.	.25	Nom.	.25	Nom.	Nom.	.25	25	.25
Pentasol (see Alcohol, Amyl) ...								
Pentasol Acetate (see Amyl Acetate) ...								
Petrolatum, Green, 300 lb bbl. lb.	.02	.02⅛	.02	.02⅛	.02⅛	.02	.02⅛	.02
Phenol, 250-100 lb drums ...lb.	.14½	.15	.14½	.15	.15	.14¾	.16	.13
Phenyl - Alpha - Naphthylamine, 100 lb kegs ...lb.	.....	1.35	.....	1.35	1.35	1.35	1.35	1.35
Phenylhydrazine Hydrochloride ...lb.	2.90	3.00	2.90	3.00	3.00	2.90		

Phosphate

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Phosphate Acid (see Superphosphate)								
Phosphate Rock, f.o.b. mines								
Florida Pebble, 68% basis. .ton	3.10	3.25	3.10	3.25	3.15	3.00	3.15	3.00
70% basis ...ton	3.75	3.90	3.75	3.90	4.00	3.75	4.00	3.50
72% basis ...ton	4.25	4.35	4.25	4.35	4.50	4.25	4.50	4.00
75-74% basis ...ton	5.25	5.50	5.25	5.50	5.50	5.25	5.50	5.00
75% basis ...ton	.....	5.75	.....	5.75	5.75	5.75	5.75	5.75
77-80% basis ...ton	.....	6.25	.....	6.25	6.25	6.25	6.25	6.25
Tennessee, 72% basis ...ton	.....	5.00	.....	5.00	5.00	5.00	5.00	5.00
Phosphorous Oxychloride 175 lb cyl ...lb.	.18	.20	.18	.20	.25	.18	.40	.20
Red, 110 lb cases ...lb.	.43	.46	.42	.46	.42	.37½	.60	.37½
Yellow, 110 lb cases wks. .lb.	.31	.37½	.31	.37½	.37½	.31	.32	.31
Sesquisulfide, 100 lb cs ...lb.	.38	.44	.38	.44	.44	.44	.46	.44
Trichloride, cylinders ...lb.	.18	.20	.18	.20	.25	.18	.35	.20
Phthalic Anhydride, 100 lb bbls wks ...lb.	.15	.16	.15	.16	.20	.15	.20	.18
Pigments Metallic, Red or brown bags, bbls, Pa. wks ...ton	37.00	45.00	37.00	45.00	45.00	37.00	45.00	37.00
Pine Oil, 55 gal drums or bbls								
Destructive dist ...lb.	.61	.63	.61	.64	.64	.63	.64	.63
Prime bbls ...bbl.	8.00	10.60	8.00	10.60	10.60	8.00	10.60	8.00
Steam dist. bbls ...gal.	.54	.61	.54	.70	.70	.65	.70	.65
Pitch Hardwood, ... wks ...ton	35.00	45.00	35.00	45.00	45.00	35.00	45.00	40.00
Plaster Paris, tech, 250 lb bbls ...bbl.	3.30	3.50	3.30	3.50	3.50	3.30	3.50	3.30
Platinum, Refined ...oz.	.....	38.00	38.00	38.00	.....	.....	.....	.....

Potash

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Potash, Caustic, wks, solid ...lb.	.06½	.06⅞	.06½	.06⅞	.06⅞	.06½	.07⅛	.06½
flake ...lb.	.0705	08	.0705	.08	.08	.0705	.07½	.0705
Potash Salts, Rough Kainit								
12.4% basis bulk ...ton	.....	9.20	.....	9.20	9.20	9.10	9.10	9.00
14% basis ...ton	.....	9.70	.....	9.70	9.70	9.60	9.60	9.50
Manure Salts ...								
20% basis bulk ...ton	.....	12.65	.....	12.65	12.65	12.50	12.50	12.40
30% basis bulk ...ton	.....	19.15	.....	19.15	19.15	18.95	18.95	18.75
Potassium Acetate ...lb.	.27	.28	.27	.30	.30	.27		
Potassium Muriate, 80% basis bags ...ton	.....	37.15	.....	37.15	37.15	36.75	36.75	36.40
Pot. & Mag. Sulfate, 48% basis bags ...ton	.....	27.80	.....	27.80	27.80	27.50	27.50	27.00
Potassium Sulfate, 90% basis bags ...ton	.....	48.25	....	48.25	48.25	47.75	47.75	47.30
Potassium Bicarbonate, USP, 320 lb bbls ...lb.	.07⅞	.09	.07⅞	.10	.10	.09½	.14	.09½
Bichromate Crystals, 725 lb casks ...lb.	.08	.08½	.08	.09	.09½	.08½	.09½	.09
Powd., 725 lb cks wks ...lb.	.13	.13½	.13	.13	.13½	.13	.13½	.13

Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1931 Average $1.404 - Jan. 1931 $1.283 - Jan. 1932 $1.54

ing anything like 780,000 tons of pure nitrogen from synthetic and natural sources in addition to what will continue to come in from Chile unless the agricultural condition should improve radically. For the time being nitrogen excess capacity is certain.

Superphosphate — While the tonnage now being taken by dealers and mixers is not as large as in former years, yet producers appear satisfied that in the long run the industry will benefit by such action. For the year 1931 the total fertilizer tag sales covering sixteen States were 73% of the sales for 1930 and 89% of the sales for 1927, according to a report by the National Fertilizer Association. For the month of December the fertilizer tag sales in the sixteen tag sale States were 97% of those for December, 1929, and 83% of 1929. Ordinarily the sales for the month of December represent about 2% of the year's total. For the five months, August-December, the sales for the sixteen States were 79% of those for the same months of 1930. Statistics just completed show that the November output of superphosphates amounted to 179,405 tons, in contrast with 187,638 tons produced in October and 367,141 tons in November, 1930. The output for eleven months of 1931 amounted to 2,513,844 tons, as compared with 4,203,057 tons during the eleven-month period in 1930.

Tanning Materials — An improved demand brought slightly better prices in some items, but existing stocks are such as to prevent any real forward movement unless conditions change very quickly. The export of logwood from Haiti during the third quarter of 1931 increased to 7,212,856 kilos worth $91,434 compared to 3,646,404 kilos valued at $31,447 in the corresponding 1930 quarter.

Tin — Straits price fluctuated within very narrow limits with the restrictive measures apparently now beginning to bear some fruit. J. H. Van Ketwich, managing director, Banka Tin Sales Office, Dutch East Indies Government, in address before the American Tin Trade Association, said tin shipments into consumption in 1931 are estimated not to have exceeded 120,000 long tons compared with world consumption of 156,000 in 1930 and 180,000 in 1929. However, as the quota rate of tin output beginning Jan. 1 was reduced to 109,806 tons a year, he said that, judging from 1931 consumption, the quota rate should enable stocks to be reduced about 11,000 tons in 1932. In regard to the outlook for tin, Mr. Van Ketwich said consumption figures for Europe for the last four months indicate

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Binoxalate, 300 lb bbls.....lb.	.14	.17	.14	.17	.17	.14	.17	.14
Bisulfate, 100 lb kegs......lb.	.16	.30	.16	.30	.30	.30	.30	.30
Carbonate, 80-85% calc. 800 lb casks..............lb.	.04¾	.05	.04¾	.07⅛	.05¾	.05⅛	.05⅞	.05⅛
Chlorate crystals, powder 112 lb keg wks...........lb.	.08	.08½	.08	.08½	.09	.08	.09	.08½
Chloride, crys bbls.........lb.	.04	.04¾	.04	.06	.06	.05½	.05½	.05½
Chromate, kegs...........lb.	.23	.28	.23	.28	.28	.23	.28	.23
Cyanide, 110 lb. cases......lb.	.55	.57½	.55	.57½	.57½	.55	.57½	.55
Metabisulfite, 300 lb. bbl...lb.	.11	.13	.11	.13	.13	.12	.13	.11
Oxalate, bbls.............lb.	.20	.24	.20	.24	.24	.20	.24	.16
Perchlorate, casks wks.....lb.	.09	.11	.09	.12	.12	.11	.12	.11
Permanganate, USP, crys 500 & 100 lb drs wks........lb.	.16	.16½	.16	.16½	.16½	.16	.16½	.16
Prussiate, red, 112 lb keg...lb.	.....	.38½	.35	.40	.40	.38	.40	.38
Yellow, 500 lb casks.....lb.	.18½	.21	.18½	.21	.21	.18½	.21	.18½
Tartrate Neut, 100 lb keg..lb.	.....	.21	.....	.21	.21	.21	.51	.51
Titanium Oxalate, 200 lb bbls ....lb.	.21	.23	.21	.23	.23	.21	.25	.21
Propyl Furoate, 1 lb tins.....lb.	.....	5.00	.....	5.00	5.00	5.00	5.00	5.00
Pumice Stone, lump bags.....lb.	.04	.05	.04	.05	.05	.04	.05	.04
250 lb bbls.............lb.	.04½	.06	.04½	.06	.06	.04½	.06	.04½
Powdered, 350 lb bags.....lb.	.02½	.03	.02½	.03	.03	02½	.03	.02½
Putty, commercial, tubs..100 lb.	2.35	2.45	2.35	2.45	.03½	.03½	.03½	.03½
Linseed Oil, kegs......100 lb.	4.00	4.75	4.00	4.75	.05½	.05½	.05½	.05½
Pyridine, 50 gal drums......gal.	1.50	1.75	1.50	1.75	1.75	1.50	1.75	1.50
Pyrites, Spanish cif Atlantic ports bulk.............unit	.12	.13	.12	.13¾	.13¾	.13	.13¾	.13
Quebracho, 35% liquid tks....lb.	.02¾	.03	.02¾	.04	.04	.02¾	.04	.03
450 lb bbls c-1..........lb.	.03½	.03¾	.03½	.03¾	.03¾	.03½	.04½	.03½
35% Bleaching, 450 lb bbl .lb.	.04	.05½	.04	.05½	.04½	.05½	.04½	.05½
Solid, 63%, 100 lb bales cif..lb.	.....	.02½	.02½	.05½	.05½	.05	.05¾	.05½
Clarified, 64%, bales.....lb.	.....	.03½	.03½	.05⅜	.05⅜	.05⅜	.05⅜	.05⅜
Quercitron, 51 deg liquid 450 lb bbls.................lb.	.05½	.06	.05½	.06	.06	.05½	.06	.05½
Solid, 100 lb boxes.........lb.	.09½	.13	.09½	.13	.13	.09½	.13	.10
Bark, Rough............ton	.....	14.00	.....	14.00	14.00	14.00	14.00	14.00
Ground................ton	34.00	35.00	34.00	35.00	35.00	34.00	35.00	34.00
R Salt, 250 lb bbls wks......lb.	.40	.44	.40	.44	.45	.40	.46	.44
Red Sanders Wood, grd bbls..lb.	.....	.18	.....	.18	.18	.18	.18	.18
Resorcinol Tech, cans........lb.	.65	.70	.65	1.25	1.25	.90	1.25	1.15
Rosin Oil, 50 gal bbls, first run ....gal.	.....	.47	.47	.58	.58	.56	.62	.57
Second run............gal.	.....	.51	.51	.61	.61	.59	.64	.60
Rosin								
Rosins 600 lb bbls 280 lb...unit ex. yard N. Y.								
B........................	.....	3.30	3.25	4.95	7.75	5.35	9.25	7.45
D........................	.....	3.40	3.35	5.50	8.00	5.50	9.25	7.70
E........................	.....	3.55	3.45	5.90	8.17	5.52½	9.27	8.30
F........................	.....	3.80	3.70	6.20	8.45	5.55	9.27	8.40
G........................	.....	3.85	3.75	6.25	8.45	5.60	9.45	8.40
H........................	.....	3.90	3.80	6.30	8.55	5.60	9.50	8 40
I........................	.....	3.95	3.85	6.35	8.58	5.62½	9.50	8.40
K........................	.....	4.35	4.10	6.45	8.65	5.62½	9.55	8.45
M........................	.....	4.75	4.20	6.70	8.80	5.65	9.85	8.50
N........................	.....	5.50	4.85	6.95	8.95	6.05	10.30	8.93
WG......................	.....	6.45	6.15	8.15	9.25	6.85	11.30	9.00
WW......................	.....	6.55	6.45	8.90	9.85	7.85	12.30	9.30
Rotten Stone, bags mines....ton	24.00	20.00	24.00	20.00	30.00	18.00	30.00	24.00
Lump, imported, bbls......lb.	.05	.07	.05	.07	.07	.05	.08	.05
Selected bbls............lb.	.09	.12	.09	.12	.12	.09	.12	.09
Powdered, bbls...........lb.	.02	.05	.02	.05	.05	.02	.05	.02
Sago Flour, 150 lb bags......lb.	.04½	.05	.04½	.05	.05	.04½	.05	.04½
Sal Soda, bbls wks.......100 lb.	.....	1.00	.....	1.00	1.00	1.00	1.00	1.00
Salt Cake, 94-96% c-1 wks. .ton	14.00	15.50	14.00	19.00	24.00	15.50	24.00	19.00
Chrome ....ton	13.00	14.50	13.00	17.00	25.00	14.50	21.00	12.00
Saltpetre, double refd granular 450-500 lb bbls..........lb.	.06½	.06¾	.06	.06¾	.06¾	.06½	.06½	.06½
Satin, White, 500 lb bbls.....lb	.....	.01½	.....	.01½	.01½	.01⅛	.01½	.01½
Shellac Bone dry bbls........lb.	.24	.26	.26	.29	.47	.28	.61	.47
Garnet, bags..............lb.	.19	.20	.19	.26	.40	.24	.45	.40
Superfine, bags............lb.	.13½	.14	.16	.22	.39	.20	.47	.39
T. N. bags...............lb.	.12	.13	.14½	.17	.34	.18	.44	.36
Schaeffer's Salt, kegs.........lb.	.48	.50	.53	.57	.57	.53	.57	.53
Silica, Crude, bulk mines....ton	8.00	11.00	8.00	11.00	11.00	8.00	11.00	8.00
Refined, floated bags......ton	22.00	30.00	22.00	30.00	30.00	22.00	30.00	22.00
Air floated bags........ton	.....	32.00	.....	32.00	32.00	32.00	32.00	32.00
Extra floated bags......ton	32.00	40.00	32.00	40.00	40.00	32.00	40.00	32.00
Soapstone, Powdered, bags f. o. b. mines.................ton	15.00	22.00	15.00	22.00	22.00	15.00	22.00	15.00
Soda								
Soda Ash, 58% dense, bags c-1 wks................100 lb.	.....	1.17½	.....	1.17½	1.40	1.40	1.40	1.40
58% light, bags.......100 lb.	.....	1.15	.....	1.15	1.34½	1.34½	1.34½	1.34½
Contract, bags c-1 wks.100 lb.	.....	1.15	1.15	1.15	1.32	1.32	1.32	1.32
Soda Caustic, 76% grnd & flake drums..............100 lb.	.....	2.90	.....	2.90	3.35	3.00	3.35	3.35
76% solid drs.........100 lb.	.....	2.50	.....	2.50	2.95	2.90	2.95	2.95
Sodium Acetate, tech....450 lb. bbls wks.................lb.	.04½	.05	.04½	.06	.05½	.04	.06¾	.04⅞
Arsenate, drums..........lb.	.25	.35	.25	.35	.19	.18	.19	.18
Arsenite, drums..........gal.	.50	.75	.50	.75	1.00	.50	1.50	.75
Bicarb, 400 lb bbl......100 lb.	.....	2.25	2.35	2.35	2.41	2.41	2.41	2.41

Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1931 Average $1.404 - Jan. 1931 $1.283 - Jan. 1932 $1.54

some improvement in use but that for the U. S. no improvement is indicated. He added that until consumption improved in this country, which is the largest tin consumer in the world, the outlook can not be certain.

Varnish Gums — The first month of the new year did not witness any improvement either in the price situation or in the tonnages being absorbed by consuming channels. Greater quantities of gums, resins and balsams have entered the U. S. during the first eleven months of 1931, the only decline being noted in the value of gum arabic purchases. Import statistics follow:*

	1930 Quantity Pounds	Value
Gum arabic	6,545,000	$934,000
Gum tragacanth	908,200	405,100
Karaya	3,390,500	304,700
Others	5,167,900	796,272

	1931 Quantity Pounds	Value
Gum arabic	6,912,300	$514,200
Gum tragacanth	1,510,700	595,500
Karaya	4,433,000	382,100
Others	7,180,100	797,900

Zinc — Weakness in the primary markets continued into the first month of the new year. Stocks of slab zinc in the U. S. continued in December the decline which they had shown in nearly every month since May 1, when they were practically unchanged from the beginning of the year. Total at end of 1931 was 129,825 tons compared with 130,865 tons on Nov. 30 and 143,618 tons on Dec. 31, 1930. Production of zinc in December, amounted to 21 965 tons compared with 20,526 in November, and 32,733 in December, 1930, according to American Zinc Insitute. Total zinc production in 1931 was 301,073 tons against 504,463 in 1930. Shipments during December were 23,005 tons against 20,327 in November and 34,254 in December, 1930. There were 22,275 retorts operating at the end of the month against 21,828 on November 30, and 33,640 at the end of 1930. An average of 20,623 retorts operated during the month, against 20,645 in November and 35,190 in December, 1930. Due to small buying, prime western zinc is available in small tonnage for January, and possibly early February shipment, at 3.10 a pound, East St. Louis, down 2½ points. This is the lowest price since 1895. Most producers are out of the market, unwilling in the face of the favorable statistical situation to sell zinc at such a low price. Low for 1931 was 3.125 and high 4 cents. Low for 1930 was 3.95 and high 5.45 cents.

*Dept. of Commerce

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Bichromate, 500 lb cks wks. lb.	.05	.05¾	.05	.07½	.07½	.07	.07¾	.07
Bisulfite. 500 lb bbl wks ... lb.	.....	.04	.....	.04	.04	.04	.04	.04
Chlorate, ... wks. . lb.	.05¾	.07¾	.05¾	.07¾	.08	.05¾	.11	.06½
Chloride, technical .... ton	12.00	13.00	12.00	13.00	13.00	12.00	13.00	12.00
Cyanide, 96-98%, 100 & 250 lb drums wks .... lb.	.16	.17	.16	.17	.20	.16	.20	.18
Fluoride, 300 lb bbls wks... lb.	.07	.07½	.07	.08½	.09	.08½	.09	.08½
Hydrosulfite, 200 lb bbls f. o. b. wks .... lb.	.22	.24	.22	.24	.24	.22	.24	.22
Hypochloride solution, 100 lb cbys .... lb.	.....	.05	.....	.05	.05	.05	.05	.05
Hyposulfite, tech, pea cyrs 375 lb bbls wks ...... 100 lb.	2.40	3.00	2.40	3.00	3.00	2.40	3.05	2.50
Technical, regular crystals 375 lb bbls wks .... 100 lb.	2.40	2.65	2.40	2.65	2.65	2.50	2.65	2.40
Metanilate, 150 lb bbls .... lb.	.44	.45	.44	.45	.45	.44	.45	.45
Metasilicate, c-l, wks... 100 lb.	.....	4.00	.....	4.00	.....	.....	.....	.....
Monohydrate, bbls .... lb.	.....	.02½	.....	.02½	.02½	.02½	.02½	.02½
Naphthionate, 300 lb bbl... lb.	.52	.54	.52	.54	.57	.52	.57	.54
Nitrate, 92%, crude, 200 lb bags c-1 NY ...... 100 lb.	.....	1.73½	1.73½	2.07	2.22½	1.99	2.22½	2.09
Nitrite, 500 lb bbls spot.... lb.	.07½	.08	.07½	.08	.08	.07½	.08	.07½
Orthochlorotoluene, sulfonate, 175 lb bbls wks .... lb	.25	.27	.25	.27	.27	.25	.27	.25
Perborate, 275 lb bbls ..... lb.	.18	.20	.18	.20	.20	.18	.22	.18
Phosphate, di-sodium, tech. 310 lb bbls .... 100 lb.	2.65	2.75	2.50	3.00	3.25	2.65	3.55	3.25
tri-sodium, tech, 325 lb bbls .... 100 lb.	.....	3.20	3.15	3.50	4.00	3.25	4.00	3.90
Picramate, 100 lb kegs ..... lb.	.69	.72	.69	.72	.72	.69	.72	.69
Prussiate, Yellow, 350 lb bbl wks .... lb.	.11½	.12	.11½	.12	12½	.11½	.12½	.12
Pyrophosphate, 100 lb keg.. lb.	.15	.20	.15	.20	.20	.15	.20	.15
Silicate, 60 deg 55 gal drs, wks .... 100 lb.	1.65	1.70	1.65	1.70	1.70	1.6	1.70	1.65
40 deg 55 gal drs, wks .... 100 lb.	.....	.75	.75	1.00	.80	.70	.80	.70
Silicofluoride, 450 lb bbls NY .... lb.	.....	.05¼	.04	.04¾	.05½	.04	.05½	.05
Stannate, 100 lb drums .... lb.	.18	.19	.18	.26	.43	.24	.43	.38
Stearate, bbls .... lb.	.20	.25	.20	.25	.29	.20	.29	.25
Sulfanilate, 400 lb bbls ..... lb.	.16	.18	.16	.18	.18	.16	.18	.16
Sulfate Anhyd, 550 lb bbls c-1 wks .... lb.	.02	.02¾	.02	.02¾	.02¾	.02½	.02¾	.02½
Sulfide, 80% crystals, 440 lb bbls wks .... lb.	.02½	.02¾	.02½	.02¾	.02¾	.02½	.02¾	.02½
62% solid, 650 lb drums lc-1 wks .... lb.	.03	.03½	.03	.03½	.03½	.03	.04	.03½
Sulfite, crystals, 400 lb bbls wks .... lb.	.03	.03½	.03	.03½	.03½	.03	.03½	.03
Sulfocyanide, bbls .... lb.	.28	.35	.28	.35	.35	.28	.76	.28¾
Tungstate, tech, crystals, kegs .... lb.	.80	.88	.80	.88	.88	.81	1.40	.88
Solvent Naphtha, tanks .... wks .... gal.	.26	.28	.24	.38	.40	.30	.40	.35
Spruce, 25% liquid, bbls ..... lb.	.....	.01	.01	.01⅜	.01⅜	.01⅜	.01⅜	.01⅜
25% liquid, tanks wks ..... lb.	.....	.01	.....	.01	.01	.01	.01	.01
50% powd, 100 lb bag wks lb.	.02	.02½	.02	.02½	.02½	.02	.02½	.02
Starch, powd., 140 lb bags .... 100 lb.	.....	2.67	2.57	3.20	4.02	3.42	4.12	3.82
Pearl, 140 lb bags ..... 100 lb.	.....	2.57	2.57	3.00	3.92	3.32	4.02	3.72
Potato, 200 lb bags .... lb.	.05½	.06	.05½	.06	.06½	.05½	.06¾	.05¾
Imported bags .... lb.	.05¾	.06½	.05¾	.06½	.06½	.05¾	.06¾	.05¾
Soluble .... lb.	.08	.08½	.08	.08½	.08½	.08	.08½	08
Rice, 200 lb bbls .... lb.	.09	.10	.09	.10	.10	.09	.10	.09½
Wheat, thick bags .... lb.	.06½	.07	.06½	.07	.07	.06½	.07	.06½
Thin bags .... lb.	.09½	.10	.09½	.10	.10	.09½	.10	.09½
Strontium carbonate, 600 lb bbls wks .... lb.	.07½	.07½	.07½	.07½	.07½	.07½	.07½	.07½
Nitrate, 600 lb bbls NY .... lb.	.07	.07½	.07	.09½	.09½	.09	.09½	.08¾
Peroxide, 100 lb drs .... lb.	.....	1.25	.....	1.25	1.25	1.25	1.25	1.25

Sulfur

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Sulfur Brimstone, broken rock, 250 lb bag c-1 .... 100 lb.	.....	2.05	.....	2.05	2.05	2.05	2.05	2.05
Crude, f. o. b. mines ...... ton	18.00	19.00	18.00	19.00	19.00	18.00	19.00	18.00
Flour for dusting 99½%, 100 lb bags c-1 NY .... 100 lb.	.....	2.40	.....	2.40	2.40	2.40	2.40	2.40
Heavy bags c-1 ...... 100 lb.	.....	2.50	.....	2.50	2.50	2.50	2.50	2.50
Flowers, 100%, 155 lb bbls c-1 NY .... 100 lb.	.....	3.45	.....	3.45	3.45	3.45	3.45	3.45
Roll, bbls lc-1 NY ..... 100 lb.	2.65	2.85	2.65	2.85	2.85	2.65	2.85	2.65
Sulfur Chloride, red, 700 lb drs wks .... lb.	.05	.05½	.05	.05½	.05½	.05	.05½	.05
Yellow, 700 lb drs wks ..... lb.	.03½	.04½	.03½	.04½	.04½	.03½	.04½	.03½
Sulfur Dioxide, 150 lb cyl .... lb.	.07	.07½	.07	.07½	.07½	.07	.08½	.07
Extra, dry, 100 lb cyl ...... lb.	.10	.12	.10	.12	.12	.10	.19	.10
Sulfuryl Chloride, ... lb.	.15	.40	.15	.40	.65	.10	.65	.10
Talc, Crude, 100 lb bgs NY ... ton	12.00	15.00	12.00	15.00	15.00	12.00	15.00	12.00
Refined, 100 lb bgs NY .. ton	16.00	18.00	16.00	18.00	18.00	16.00	18.00	16.00
French, 220 lb bags NY ... ton	18.00	22.00	18.00	22.00	22.00	18.00	25.00	18.00
Refined, white, bags .... ton	35.00	40.00	35.00	40.00	40.00	35.00	45.00	35.00
Italian, 220 lb bags NY ... ton	40.00	50.00	40.00	50.00	50.00	40.00	50.00	40.00
Refined, white, bags .... ton	50.00	55.00	50.00	55.00	55.00	50.00	55.00	50.00
Superphosphate, 16% bulk, wks .... ton	.....	8.00	7.50	9.00	9.50	8.00	10.00	9.00
Triple bulk, wks .... unit	.....	.65	.....	.65	.65	.65	.....	.....
Tankage Ground NY .... unit	.....	1.50&10	1.50	3.20&10	4.00&10	3.20&10	4.50&10	4.00&10
High grade f.o.b. Chicago. unit	.....	1.50&10	1.50	3.25&10	3.85&10	3.25&10	4.80&10	3.75&10
South American cif .... unit	.....	2.25&10	2.00	3.40&10	4.25&10	3.40&10	4 80&10	4.35&10
Tapioca Flour, high grade bgs. lb.	.03½	.05	.03½	.05	.05¾	.03	.05¾	.04½
Medium grade, bags ..... lb.	.03	04	.03	.04	.04¾	.02½	.04¾	.03¾
Tar Acid Oil, 15%, drums .... gal.	.21	.22	.21	.25	.27	.24	.27	.26
25% drums .... gal.	.23	.24	.23	.28	.30	.26	.30	.29

Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1931 Average $1.404 - Jan. 1931 $1.283 - Jan. 1932 $1.54

OILS AND FATS

Total movement of animal oils and fats in 1931 was 645,241,365 pounds, valued at $56,803,725; in 1930 the total outgo was 734,135,103 pounds, valued at $82,973,585; shipments of cottonseed oil showed a loss in crude and a gain in refined oil as follows:

Crude—1931, 12 months—9,732,945 pounds ($581,837); 1930—16,393,539 pounds ($1,227,902).

Refined—1931, 12 months—12,844,712 pounds ($1,161,641); 1930—11,903,072 pounds ($1,167,675). In other words, the poundage was greater in 1931 and the value lower.*

		December 1930	1931
Total animal oils & fats	Lbs.	52,206,667	72,239,223
Total animal oils & fats	$	5,702,898	5,202,241
Oleo oil	Lbs.	4,246,935	4,300,631
Oleo oil	$	362,858	293,625
Lard	Lbs.	45,113,994	65,597,526
Lard	$	5,056,611	4,727,380
Neutral lard	Lbs.	1,167,092	1,134,944
Neutral lard	$	139,332	95,549
Lard compounds	Lbs.	144,779	100,034
Animal fats	$	18,225	9,152
Margarine of animal	Lbs.	52,787	48,205
or vegetable fats	$	8,701	6,001
Cottonseed oil, crude	Lbs.	787,068	562,140
Cottonseed oil, crude	$	49,859	22,973
Cottonseed oil, refined	Lbs.	1,257,953	574,040
Cottonseed oil, refined	$	115,811	41,963
Lard compounds	Lbs.	508,862	219,412
Vegetable fats	$	63,470	23,444

		Twelve Months 1930	1931
Total animal oils & fats	Lbs.	734,135,103	645,241,365
Total animal oils & fats	$	82,978,585	56,803,725
Oleo oil	Lbs.	56,483,104	47,322,604
Oleo oil	$	5,871,281	3,308,704
Lard	Lbs.	642,486,396	568,708,208
Lard	$	73,433,649	51,069,063
Neutral lard	Lbs.	13,531,125	9,588,125
Neutral lard	$	1,631,347	928,848
Lard compounds	Lbs.	2,436,243	1,645,501
Animal fats	$	290,901	173,269
Margarine of animal	Lbs.	691,805	546,741
or vegetable fats	$	109,887	73,918
Cottonseed oil, crude	Lbs.	16,393,539	9,732,945
Cottonseed oil, crude	$	1,227,902	581,837
Cottonseed oil, refined	Lbs.	11,903,072	12,844,712
Cottonseed oil, refined	$	1,167,675	1,161,641
Lard compounds	Lbs.	6,354,473	4,348,074
Vegetable fats	$	845,216	531,444

Chinawood Oil — The market showed much firmer tendencies in the last half of the month when the news from the Far East became much more acute and threatening and some consumers were desirous of accumulating stocks ahead. Total exports of China wood oil from Hankow during December amounted to 3,096,000 pounds, of which 1,176,000 pounds were sent to the United States and 1,820,000 pounds to Europe. At the end of December the stocks of oil on hand at Hankow were estimated to be 980 short tons. Market quotations have been computed by the Chemical Division and conversion rates and equivalents in United States currency have been calculated at the current cable quotations of the Shanghai tael. The

*Dept. of Commerce

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Terra Alba Amer. No. 1, bgs or bbls mills 100lb.	1.15	1.75	1.15	1.75	1.75	1.15	1.75	1.15
No. 2 bags or bbls 100lb.	1.50	2.00	1.50	2.00	2.00	1.50	2.00	1.50½
Imported bags lb.	.01⅛	.01½	.01⅛	.01¼	.01½	.01⅛	.02½	.01
Tetrachlorethane, 50 gal dr. lb.	.09	.09½	.09	.09½	.09½	.09	.09¼	.09
Tetralene, 50 gal drs wks lb	..	.20	.....	.20	.20	.20	.20	.20
Thiocarbanilid, 170 lb bbl lb.	.25	.28½	.25	.28½	.28½	.22	.24	.22
Tin								
Crystals, 500 lb bbls wks lb.	.23½	.24	.23	.28½	.34	.25	.38	.33
Metal Straits NY lb	.....	.21⅞	.21¾	.27	.38	.26	.48	.39
Oxide, 300 lb bbls wks lb	.....	.23	.23	.29	.42	.25	.56	.42
Tetrachloride, 100 lb drs wks lb.	.....	.165	.1605	.19½	.20½	.18¼	.30½	.27½
Titanium Dioxide 300 lb bbl. lb	.20½	.21	.20½	.22	.50	.21	.50	.22
Pigment, bbls lb.	06½	.07¾	.06½	.07¾	.07¾	.06½	.14	.07½
Toluene, 110 gal drs gal.	.....	.35	.34	.35	.40	.35	.45	.45
8000 gal tank cars wks gal.	.....	.30	.27	.30	.35	.30	.40	.40
Toluidine, 350 lb bbls lb.	.88	.89	.88	.94	.94	.90	.94	.90
Mixed, 900 lb drs wks lb	.27	.32	.27	.32	.32	.27	.32	.31
Toner Lithol, red, bbls lb.	.90	.95	.90	.95	.95	.90	.95	.85
Para, red, bbls lb.	.....	.80	.....	.80	.80	.80	.80	.70
Toluidine lb.	1.50	1.55	1.50	1.55	1.55	1.50	1.55	1.50
Triacetin, 50 gal drs wks lb.	32	.36	.32	.36	.36	.32	.36	.32
Trichlorethylene, 50 gal dr lb.	.10	.10½	.10	.10½	.10½	.10	.10½	.10
Triethanolamine, 50 gal drs lb.	40	.42	.40	.42	.42	.40	.60	.55
Tricresyl Phosphate, drs lb.	.26	.35	.26	.45	.45	.33	.45	.33
Triphenyl guanidine lb.	.58	60	.58	.60	.60	.58	.70	.58
Phosphate, drums lb.	.50	.65	.50	.70	.70	.60	.75	.60
Tripoli, 500 lb bbls 100 lb.	.75	2.00	75	2.00	2.00	1.75	2.00	1.75
Tungsten, Wolframite, per unit	11.00	11.75	11.00	11.75	.....	.....	.....	.....
Turpentine carlots, bbls gal.	.39	.39¼	.36½	.57	.61¼	.41	.65	.51¼
Wood Steam dist. bbls gal.	.44	.45	38	.61	.52	.36	.57	.49
Urea, pure, 112 lb cases lb	.15	.17	.15	.17	.17	.15	.30	.15
Fert. grade, bags c.i.f. ton	...	82.60	.....	82.60	108.00	108.00	105.00	98.00
c. i. f. S. points ton	.....	82.60	.....	82.60	109.30	109.30	106.30	99.30
Valonia Beard, 42%, tannin bags ton	32.00	34.00	33.00	40.00	40.00	39.50	55.00	42.00
Cups, 30-31% tannin ton	22.50	23.50	22.50	25.00	27.00	24.00	35.00	30.00
Mixture, bark, bags ton	25.00	26.00	25.00	31.00	32.50	30.00	43.00	35.00
Vermillion, English, kegs lb.	1.53	1.80	1.53	1.80	2.05	1.75	2.05	2.00
Vinyl Chloride, 16 lb cyl lb.	.....	1.00	.....	1.00	1.00	1.00	1.00	1.00
Wattle Bark, bags ton	32.00	34.50	32.00	41.00	47.75	40.00	49.75	43.50
Extract 55%, double bags ex-dock lb.	.05	.06½	.05	.06½	.06½	.05⅞	.06½	.06½
Whiting, 200 lb bags, c-1 wks 100 lb.	.85	1.00	.85	1.00	1.00	1.00	1.25	1.00
Alba, bags c-1 NY ton	.....	13.00	.....	13.00	13.00	13.00	13.00	13.00
Gilders, bags c-1 NY 100 lb.	.....	1.35	.....	1.35	1.35	1.35	1.35	1.35
Xylene, 10 deg tanks wks gal.	.....	.29	.....	.29	.31	.28	.33	.33
Commercial, tanks wks gal.	.....	.26	.24	.30	.33	.25	.32	.30
Xylidine, crude lb.	.36	.37	.36	.37	.38	.37	.38	.38

Zinc

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Zinc Ammonium Chloride powd., 400 lb bbls 100 lb.	5.25	5.75	5.25	5.75	5.75	5.25	5.75	5.25
Carbonate Tech, bbls NY lb.	.10½	.11	.10½	.11	.11	.10½	.11	.10½
Chloride Fused, 600 lb drs. wks lb.	.05¾	.06	.05¾	.06	.06	.05¾	.06	.05¾
Gran., 500 lb bbls wks lb.	.05¾	.06	.05¾	.06	.06½	.05¾	.06½	.06¼
Soln 50%, tanks wks 100 lb.	2.25	3.00	2.25	3.00	3.00	2.25	3.00	3.00
Cyanide, 100 lb drums lb.	.38	.39	.38	.39	.41	.38	.41	.40
Dithiofuroate, 100 lb dr lb.	.....	1.00	.....	1.00	1.00	1.00	1.00	1.00
Dust, 500 lb bbls c-1 wks lb.	.0515	.0525	.0515	.07	.11	.06	.08¾	.08½
Metal, high grade slabs c-1 NY 100 lb.	.....	3.22½	3.50	4.45	6.45	4.10	6.45	6.45¾
Oxide, American bags wks lb.	.06½	.07	.06½	.07	.07⅛	.06½	.07⅛	.07
French, 300 lb bbls wks lb.	.09⅜	.11⅜	.09⅜	.11⅜	.11⅜	.09⅜	.11⅜	.09⅜
Perborate, 100 lb drs lb.	.....	1.25	.....	1.25	1.25	1.25	1.25	1.25
Peroxide, 100 lb drs lb.	.....	1.25	.....	1.25	1.25	1.25	1.25	1.25
Stearate, 50 lb bbls lb.	.18½	.22	.18½	.23	.26	.20	.26	.25
Sulfate, 400 bbl wks lb.	.03	.03½	.03	.03½	.03½	.03	.03¾	.03
Sulfide, 500 lb bbls lb.	.13	.13½	.13	.16½	.32	.16	.32	.30
Sulfocarbolate, 100 lb keg lb.	.22	.24	.22	.30	.30	.28	.30	.28
Zirconium Oxide, Nat. kegs lb.	.02½	.03	.02½	.03	.03	.02½	.03	.02½
Pure kegs lb.	.45	.50	.45	.50	.50	.45	.50	.45
Semi-refined kegs lb.	.08	.10	.08	.10	.10	.08	.10	.08

Oils and Fats

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Castor, No. 1, 400 lb bbls lb.	.09½	.10	.10	.12	.13½	.11½	.13½	.13
No. 3, 400 lb bbls lb.	.....	.10½	.09½	.11¾	.13	.11	.13	.12½
Blown, 400 lb bbls lb.	.12	.12½	.12½	.14	.15	.12	.15	.14
China Wood, bbls spot NY lb.	.07	.07½	.07	.07½	.13	.07	.16	.14½
Tanks, spot NY lb.	.06	.06¼	.06	.07	.11⅜	.06	.15	.13½
Coast, tanks, lb.	.05⅝	.06	.05½	.06½	.10⅞	.05½	.14¼	.12½
Cocoanut, edible, bbls NY lb.	....	.10¾	.....	.10¾	.10¾	.10¾	.10¾	.10¾
Ceylon, 375 lb bbls NY lb.	.04⅜	.04¾	.04⅜	.06½	.08¼	.06⅜	.09½	.07⅞
8000 gal tanks NY lb.	.03⅞	.04	.03⅞	.06	.07	.05½	.08⅜	.06⅜
Cochin, 375 lb bbls NY lb.	.05⅛	.06	.05⅛	.07	.09½	.07½	.10	.09¾
Tanks NY lb.	.04¾	.05	.04⅜	.05¾	.08½	.07	.09½	.08⅜
Manila, bbls NY lb.	.04⅜	.05	.04⅜	.07	.08½	.06½	.09½	.07⅞
Tanks NY lb.	.03⅜	.04	.03⅜	.05⅛	.07⅛	.05⅜	.08⅜	.06⅜
Tanks, Pacific Coast lb.	.....	.03½	.03	.05	.07	.05⅛	08	.06⅜

Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1931 Average $1.404 - Jan. 1931 $1.283 - Jan. 1932 $1.54

range of prices for December at Hankow go down for processed oil, naked, less overhead taxes, packing, coolie hire, insurance and other incidental charges was as follows:

	Open	*High*	*Low*	*Close*
Hankow taels per picul...	22.30	21.	20.10	20.60
American dollars price per pound...	.053	.054	.051	.052

An examination of the following statistics reveals that a considerable decline in total exports of oil was experienced during the past year as compared with 1930. It will be further noted that the share of the United States was considerably less in quantity than for the preceding year, whereas the quantity shipped to Europe was only slightly decreased.

	Pounds	
	Total Exports	*To United States*
December, 1931.......	3,096,000	1,176,000
November, 1931.......	6,712,000	4,122,000
December, 1930.......	5,274,000	3,008,000
Jan.-Dec., 1931.......	94,266,000	72,072,000
Jan.-Dec., 1930.......	139,012,000	114,544,000

	To Europe, pounds	*Hankow stock short tons*	*Market close price per pound*
December, 1931......	1,920,000	980	.052
November, 1931......	2,590,000	780	.053
December, 1930......	2,266,000	5,300	.054
Jan.-Dec., 1931......	22,194,000		
Jan.-Dec., 1930......	24,468,000		

Copra — The unsettled conditions in the Far East brought about an increase in prices during the month. Very little material was being offered in the primary markets.

Official November Exports from Philippines (In thousands)

Copra	*Kilos*	*Pesos*
Total........................	7,175	559
To United States..............	6,243	499
To France.....................	610	38
To Spain......................	51	3
To Japan......................	271	19

Coconut Oil	*Kilos*	*Pesos*
Total........................	7,533	1,160
To United States..............	6,144	981
To Great Britain..............	1,266	158
To China......................	86	12
To Japan......................	23	4
To Dutch East Indies..........	14	5

Soy Bean Oil — Quotations moved within very narrow limits but the general trend of prices was down. The Department of Commerce announces that according to preliminary census figures there were sixteen mills in the United States which crushed soy beans during the quarter ended December 31, 1931, reporting a crush of 38,803 tons and a production of 10,655,357 pounds of oil. These figures compare with 21,773 tons of beans crushed and 6,193,747 pounds of oil produced for the corresponding quarter in 1930, 19,829 tons of beans and 5,230,680 pounds of oil in 1929.

	Current	Market	1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Cod, Newfoundland, 50ga. bbls ....gal.	.....	.30	.26	.48	.56	.46	.64	.57½
Tanks NY..........gal.	.....	.28	.24	.45	.62	.48	.60	.60
Cod Liver see Chemicals........								
Copra, bags..........lb.	.0230	.0235	.0195	.0325	.046	.039	.05½	.042
Corn, crude, bbls NY........lb.	.05¾	.09	.05¾	.09	.10	.08½	.10¾	.09½
Tanks, mills..........lb	.03⅜	.03½	.03⅜	.07½	.08	.06½	.09⅛	.07⅞
Refined, 375 lb bbls NY....lb.	.06¾	.07	.06¾	.10½	.10½	.09½	.11¾	.10½
Tanks..........lb.	.08½	.08¾	.08	.08¾	.10	.08	.11	.09
Cottonseed, crude, mill......lb.	.03	.03½	.03	.07	.07½	.06⅛	.09	.08⅛
Degras, American, 50 gal bbls NY..........lb.	.03¼	.04	.03¼	.04¼	.04½	.03½	.05	.03½
English, brown, bbls NY...lb.	.03⅞	.04	.03⅞	.05	.05	.04½	.05⅛	.04½
Light, bbls NY..........lb.	.04	.04½	.04	.05½	.05½	.05	.05⅞	.05
Dog Fish, Coast Tanks.....gal.	.....	.32	.....	32	.34	.32		
Greases								
Greases, Brown..........lb.	.02	.02¼	.02	.04¼	.06½	.04	.08½	.06
Yellow..........lb.	.02½	.03	.02	.05	.07½	.03⅞	.08½	.06½
White, choice bbls NY.....lb	.03¾	.04½	.03¼	.05¾	.08½	.06	.11½	.07½
Herring, Coast, Tanks......gal.	.....	Nom.	.....	Nom.	.....	.....		
Horse, bbls..........lb.	.05½	Nom.	.05½	Nom.	Nom.	.05½	Nom.	.....
Lard Oil, edible, prime.......lb.	.10¾	.11	.10¾	.13	.13½	.12½	.15¾	.14¾
Extra, bbls..........lb.	.07	.07½	.07	.10	.12	.10	.13½	.12
Extra No. 1, bbls..........lb.	.06¼	.07	.06¼	.09¾	.11	.09¾	.13¼	.11¾
Linseed, Raw, five bbl lots...lb.	.....	.074	.077	.102	.146	.096	.162	.105
Bbls c-1 spot..........lb.	.....	.066	.069	.098	.142	.092	.158	.101
Tanks..........lb.	.....	.06	.063	.092	.134	.086	.15	.093
Menhaden Tanks Baltimore.gal.	.17½	.20	.14	.22	.50	.21	.52	.45
Extra, bleached, bbls NY..gal.	.38	.40	.38	.53	.70	.52	.70	.70
Light, pressed, bbls NY...gal.	.33	.34	.33	.38	.64	.36	.64	.63
Yellow, bleached, bbls NY.gal.	.36	.37	.30	.42	67	.38	.67	.66
Mineral Oil, white, 50 gal bbls ....gal.	.40	.60	.40	.60	.60	.40	.60	.40
Russian, gal..........gal.	.95	1.00	.95	1.00	1.00	.95	1.00	.95
Neatsfoot, CT, 20° bbls NY .lb.	.13¼	.13½	.13¼	.16	.17⅞	.16½	.19	.18½
Extra, bbls NY..........lb	.06¾	.07	.07	.10	.11⅛	.09½	.13½	.12
Pure, bbls NY..........lb.	.....	.09¾	.09½	.12	.13⅛	.11½	.15½	.13½
Oleo, No. 1, bbls NY........lb.	.07½	.07⅞	.06⅝	.08	.12½	.08⅞	.11⅛	.10¾
No. 2, bbls NY..........lb.	.06⅝	.07	.05¾	.08	.11	.08⅛	.11½	.10
No. 3, bbls NY..........lb.	.....	.06¾	.06¾	.09	.10½	.09	.10⅛	.09¾
Olive, denatured, bbls NY...gal.	.62	.70	.59	.80	1.00	.70	1.40	1.05
Edible, bbls NY..........gal.	1.65	2.00	1.50	2.00	2.00	1.75	2.00	1.95
Foots, bbls NY..........lb.	.04½	.05	.04½	.06¾	.08	.06	.11⅛	.08⅛
Palm, Kernel, Casks..........lb.	.03⅞	.04	.04⅛	.06¼	.08¼	.06	.09	.08
Lagos, 1500 lb casks.......lb.	.04	.05	.04	.06	.07¾	.05¾	.09	.07½
Niger, Casks..........lb.	.03⅛	.03½	.03½	.05¼	.07½	.05⅛	.08¾	.07
Peanut, crude, bbls NY......lb.	.03¾	.04	.03¾	.05	Nom.	.....	Nom.	.....
Refined, bbls NY..........lb.	.08½	.09	.08½	.14	.15	.12	.15	.14½
Perilla, bbls NY..........lb.	.05¼	.05½	.05½	.11	.14½	.10	.20	.15
Tanks, Coast..........lb.	.....	.05	.05	.09	.11½	.08	.15⅞	.13
Poppyseed, bbls NY........gal.	1.70	1.75	1.70	1.75	1.75	1.70	1.75	1.70
Rapeseed, blown, bbls NY...gal.	.68	.70	.68	.73	1.00	.74	1.04	1.04
English, drms. NY........gal.	.....	.75	.....	.75	.82	.75	.90	.82
Japanese, drms. NY......gal.	.56	.58	.56	.58	.70	.56	.88	.72
Red, Distilled, bbls..........lb.	.06⅝	.07	.07⅞	.09	.10⅞	.08⅝	.11⅝	.10½
Tanks..........lb.	.05¾	.06	.06½	.08¼	.09½	.07¾	.10½	.09½
Salmon, Coast, 8000 gal tks..gal.	.....	.19	.19	.22	.44	.42	.44	.42
Sardine, Pacific Coast tks...gal.	.17	.17½	.17	.19	.42	.18	.51	.45
Sesame, edible, yellow, dos...lb.	.08½	.09	.08½	.10¾	.12	.09	.12	.11½
White, dos..........lb.	.10	.11	.10	.12	.12½	.10	.12½	.12½
Sod, bbls NY..........gal..	.....	.40	.....	.40	.40	.40	.40	.40
Soy Bean, crude..............								
Pacific Coast, tanks.......lb.	.03	.03½	.03⅞	.08	.09¼	.07	.10⅞	.09
Domestic tanks, f.o.b. mills, ...lb.	.....	.032	.032	.07	.08⅛	.07	.10½	.08½
Crude, bbls NY..........lb.	.04¾	.05	.04¾	.08	.10¾	.10	.12¾	.11
Tanks NY..........lb.	.04¼	.04½	.04¼	.08	.09¾	.09	.11½	.10½
Refined, bbls NY..........lb.	.058	.06	.058	.09	.13½	.13	.13½	.13½
Sperm, 38° CT, bleached, bbls NY..........gal.	.68	.70	.68	.85	.85	.84	.85	.84
45° CT, bleached, bbls NY gal.	.63	.65	.63	.80	.80	.79	.80	.79
Stearic Acid, double pressed dist bags..........lb.	.08½	.09	.08½	.11	.15	.13½	.18½	.15½
Double pressed saponified bags ....lb.	.07	.07½	.08	.12	.15½	.14½	.19	.15⅞
Triple, pressed dist bags..lb	.10¾	.11	.11	.14	.17	.15½	20½	.17¾
Stearine, Oleo. bbls..........lb.	.05½	.06	.05½	.08¾	.09½	.08½	.12	.09½
Tallow City, extra loose......lb.	.03⅛	.03⅜	.02⅞	.04	.07⅛	.04½	.08⅜	.07
Edible, tierces..........lb.	.03⅞	.04	.03⅞	.06	.09½	.05½	.10½	.08
Tallow Oil, Bbls, c-1 NY...lb.	.07	.07½	.07	.08¾	.11	.08⅝	.12	.10⅞
Acidless, tanks NY........lb.	.07⅞	.09	.07⅞	.09	.10	.08½	.11	.09⅞
Vegetable, Coast mats.....lb.	.06	Nom.	.06½	Nom.	Nom.	.06½	Nom.	.08
Turkey Red, single bbls......lb.	.07	.09	.07	.10	.12	.10	.12	.11
Double, bbls..........lb.	.09	.11	.09	.10	.16	.13	.16	.14
Whale, bleached winter, bbls NY..........gal.	.....	.74	.....	.74	.74	.74	.80	.74
Extra, bleached, bbls NY..gal.	.58	.60	.58	77½	.76	.76	.82	.76
Nat. winter, bbls NY.....gal.	.53	.55	.53	.72	.73	.73	.78	.73

Index to Advertisers

"We"—Editorially Speaking

With the issuance of the Jan. 1, 1932 number The Chemical Trade Journal (London) commenced its 90th volume and the 45th year of publication with an unbroken record of 2,327 weekly issues. By comparison we are still in our teens. A youngster wishes his distinguished elder many happy returns of the first publication date, May, 1887.

Possibly Professor Moody of City College was exaggerating somewhat when he told recently that the Soviet officials had refused to permit a copy of the periodic chart of the elements to come into Russia for fear that it was secret propaganda against communism, Stalinism, etc. How far can such a country progress in five years in an industry as highly technical as the chemical! Gareth R. V. Jones who takes us behind the scenes of chemical Soviet Russia has just returned from a three months visit to the principal chemical producing centers. What he saw was reassuring. Despite Sir Harry McGowan's solemn warning of a year ago, Russia is a long way from usurping the places now held by Germany, Great Britain and America. Mr. Jones is a trained observer having been confidential foreign investigator for David Lloyd George for several years. He has the ability to see both sides of every question, to prevent personal beliefs from clouding his sense of proportion.

Glancing through our back copies of 15 years ago while preparing "Fifteen Years Ago" we found the following news item:

"Only two chemical stocks are listed on the New York Stock Exchange and the shares of these are closely held. One large drug store incorporation is on the list and a few fertilizer companies. No dyestuff company has yet made application; but it is expected that a recently organized company will soon place its shares on this market". Listing the monthly transactions made in stocks of concerns chemical and closely allied industries requires two full pages of Chemical Markets. We have indeed grown up!—or down ?

Why worry about working capital for the future expansion of the chemical industry when in an alleged mail fraud scheme built upon a pseudo-scientific atom-splitting power generating machine $1,000,000 was raised by six men now under indictment.

St. Valentine, Chemist

On Valentine's Day 1877 a Harvard student in chemistry who in later years made his name famous sent the following to his Lady Fair in a mood quite modern enough for our smartest magazines.

Leaving your homes on proud Olympus height
Oh! Muses Nine commune with me this night
Assist my harp, my feeble pen inspire
And all my soul illumene with Greek fire.

For I would sing of Chemistry alone
Things oft unite as I hope to prove,
Affinities and Acids, Cupid's darts,
Alkalies, Carbon-compounds, bleeding hearts
And all that sort of thing in such connection
As best may demonstrate my deep affection.

Rhapsody

If thou were potent Oxygen, and I were Hydroxyle
And these two might unite, (sit still, my heart, sit still)
How sweet 'twould be, to mingle as we'd oughter,
And quench our burnings, in a drop of water.

If I sulphuric acid were,
And thou my love magnesia,
How quickly would that Acid haste,
My dearest girl, to seize you!

Or were thou Oxhydrogen
And were I, C. A. O.
How brilliantly under this
Our flame of love would glow.

T'were sweet, most sweet in any form
With thee love to unite.
But Ah! I know, too well I know
That dream is all too bright.

Then since the fates forbid us love
Thus sweetly to combine,
I must submit, and only beg
To be thy
Valentine.

Who knows but what Arthur Schoen, aged 16, may be a future director of one of our chemical companies. He writes: "I am applying to you for help in getting myself a job because I believe you may know a chemical firm I can be of use. I am anxious to locate with a firm where there is a chance for advancement. I intend to make chemistry my career because I think it is the most worthwhile thing in the world. Experience has taught me how to conduct myself in the laboratory. I am willing to do whatever is required of me, including hard physical labor." Young Schoen has many of the requisites for success and incidently one of faith that many of us could well cultivate in these particular times.

In November, 1930 the Chemist's Club in New York received a request that it become the custodian of a sealed communication ostensibly of a scientific nature the same to be held until a certain specified date. *The Percolator* assures its readers that such action is not uncommon abroad where scientific societies are often the medium of safe keeping of such documents. To make the story a real thriller we should have a villian forcing his way into the Chemist's Club safe. Modern style calls for a racketeer, and almost any chemical sales manager could make a number of suitable nominations for this Desperate Desmond role.

In addition to his duties as manager of the special car department of the General American Tank Car Corp., A. L. Belding whose recent address before the Compressed Gas Manufacturers' Association is printed in the Plant Management section, is called upon twice each year to act as betting commissioner for members of the Chlorine Institute at their golf outings at Seaview Golf Club. The sessions last from Thursday to Sunday afternoon and for the past five years a distinct note of harmony has prevailed where before the "You did" and "You did not's" rent the air. Mr. Belding's services to the members of the Institute in bringing into their midst serenity instead of discord is only exceeded by his feats of designing suitable means of economical transportation for new and unusual chemicals.

Robert C. Burnside who fires the opening gun in a series of articles to appear in Chemical Markets on the subject of taxes is president of the Asbestolith Manufacturing Co., and managing director of the N. Y. Board of Trade. He is the man who built Grant's Tomb, and at the moment, he is directing the installation of all the floors in the S. S. Manhattan now building and he did a similar job on the Dollar Liners, President Hoover and President Coolidge. Despite the exacting character of his private business he gives freely of his time in the interests of his city.